AUGUST

THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION

Vitamin D and Caries—*Anderson et al.*
Oral Roentgenology—*Ennis*
Periodontal Disease—*Fixott*
Effect of Diet on Teeth—*Wallace*
Slice and Box Preparations—*Wylie*
Diseases of Oral Cavity—*Feldman*
Teeth of Melanesians—*Stein and Epstein*
Difficult Teeth—*Wahl*
Mottled Enamel—*Dean*
Gold Alloys—*Tylman*
Sarcoma of Mandible—*Galt*
Cleft Palate and Cleft Lip—*Shearer*
Oral and Gastric Surgery—*Meyer*

EDITORIALS

Council and Dentifrice Question
Dental Creed
Dilemma of Ethics
The Journal: Who Reads It?

COUNCIL ON DENTAL THERAPEUTICS

Peralga and Allonal—Not Acceptable

BUREAU OF PUBLIC RELATIONS

Group Practice—*Morris*

PROPERTY OF
DENTAL LIBRARY
UNIVERSITY OF MICHIGAN
DO NOT CIRCULATE OR REMOVE

CONTENTS

Bird's-Eye View of St. Paul, Minn. ..... Frontispiece

ORIGINAL COMMUNICATIONS

The Influence of Vitamin D in the Prevention of Dental Caries.
By P. G. Anderson, D.D.S.; C. H. M. Williams, D.D.S.; H. Halderson, D.D.S.; C. Summerfeldt, D.D.S., and R. Gordon Agnew, D.D.S. 1349
Oral Roentgenology and Its Possibilities.
By Le Roy M. Ennis, D.D.S. 1367
Roentgenographic Studies of Periodontal Disease.
By Henry Cline Fixott, D.M.D., F.A.C.D. 1377
A Century of Progress in Human Nutrition in Relation to Dental Hygiene, and the Effect of Diet on the Teeth.
By J. Sim Wallace, M.D., D.Sc. L.D.S., F.A.C.D. 1384
A Comparative Study of Slice and Box Preparations.
By W. L. Wylie, D.D.S. 1391
Diseases of the Oral Cavity.
By Samuel Feldman, M.D. 1401
Case Report.
By Hugh E. Black, D.D.S. 1408
The Molar Teeth of New Britain Melanesians.
By M. Russell Stein, D.D.S., and Julius L. Epstein 1409
Management of Difficult Teeth.
By J. P. Wahl, D.D.S. 1414
Classification of Mottled Enamel Diagnosis.
By H. Trendley Dean, D.D.S. 1421
Gold Alloys: An Evaluation of Research Data in Relation to Clinical Requirements.
By Stanley D. Tylman, A.B., D.D.S., M.S., F.A.C.D. 1426
Dedication of Wells and Morton Tablets.
By P. G. Puterbaugh, D.D.S. 1440
Medullary and Subperiosteal Osteogenic Sarcoma of the Mandible, with Report of a Case.
By Charles B. Galt, D.D.S. 1442
Cleft Palate and Cleft Lip.
By William Lete Shearer, A.B., M.D., D.D.S. F.A.C.S., F.A.C.D. 1446
The Association of Oral and Gastric Surgery.
By Karl A. Meyer, M.D. 1455
Anisocoria of Dental Origin.
By Arrigo Piperno, M.D., D.D.S. 1459
Amalgam Inlays.
By V. A. Sweetnam, D.D.S. 1461

EDITORIAL DEPARTMENT

The Council on Dental Therapeutics and the Dentifrice Question.—The Dental Creed.—Dilemma of Ethics.—The Journal: Who Reads It? 1463-1473

Obituary: Harris W. McClain, D.D.S. (1881-1934) 1473

Practice in Paragraphs 1474

COUNCIL ON DENTAL THERAPEUTICS

Peralga—Not Acceptable for Accepted Dental Remedies 1476
Allonal—Not Acceptable for A.D.R. 1481
Annual Meeting of the Council on Dental Therapeutics 1485
Accepted Dental Remedies 1500

BUREAU OF PUBLIC RELATIONS

Effect of Group Practice upon Dentist and Patient.
By E. W. Morris, D.D.S. 1502
A Month Health Project in an Iowa Rural School.
By Edith M. Holstrom 1512

CURRENT LITERATURE

Extracts and Abstracts 1516

MISCELLANY

Book Review 1522

NEWS

State, General and Foreign News 1524

Announcements 1527

LIBRARY BUREAU

Hospital Dental Service 1530
The Dental Creed 1531

ADVERTISEMENTS

Index to Advertisements A-37
Classified Section A-28

The Journal of the American Dental Association, Vol. XXI, No. 8. Published by the American Dental Association, 212 East Superior Street, Chicago, Ill. Yearly subscription, $3.50. Entered as second-class matter, May 1, 1928, at the postoffice at Chicago, Ill., under the act of Aug. 24, 1912. Published monthly.

Copyright, 1934, by the American Dental Association.

Bird's-eye view of St. Paul, Minn., where the Seventy-Sixth Annual Session of the American Dental Association will be held, August 6-10.

THE JOURNAL
of the AMERICAN DENTAL ASSOCIATION

Vol. 21 AUGUST, 1934 No. 8

Original Communications

THE INFLUENCE OF VITAMIN D IN THE PREVENTION OF DENTAL CARIES*

By P. G. ANDERSON, D.D.S.; C. H. M. WILLIAMS, D.D.S.; H. HALDERSON, D.D.S.; C. SUMMERFELDT, D.D.S., and R. GORDON AGNEW, D.D.S., Toronto, Canada

ATTENTION was first directed some years ago by May Mellanby[1] to the possible influence of vitamin D on the formation and maintenance of the normal structure of the tooth. The original observations were made on animals which were used by her husband, Prof. E. A. Mellanby, in his studies on vitamin D and its relation to rickets. During recent years, Mrs. Mellanby has extended her observations to children[2] and has shown that the addition of vitamin D to the diet significantly retards the progress of dental caries. McBeath,[3] in 1932-1933, obtained results which tend to support Mellanby's views as to the importance of vitamin D in the prevention of tooth decay. Schoenthal and Brodsky[4] obtained similar results when vitamin D was added to a deficient diet, but they obtained only a slight reduction in the incidence of dental caries when this vitamin was added to an otherwise well-balanced diet. In New Zealand, Jameson and Cox[5] have reported a lowered incidence of tooth decay as a result of the administration of vitamin D. In accord with Mellanby's earlier work on the influence of vitamin D on the formation of teeth,

*From the Department of Paediatrics, University of Toronto.

*Read before the Toronto Academy of Dentistry, December, 1933.

*With a statistical analysis of the results, by C. B. Weld, M.D., Toronto, Canada.

1. Mellanby, May: Lancet, 2:767 (Dec. 7) 1918.

2. Mellanby, May: Medical Research Council Special Report Series, No. 159, 1931.

3. McBeath, E. C.: J. D. Res., 12:723 (Oct.) 1932; New York State J. Med., 33:1086 (Sept.) 1933.

4. Schoenthal, L., and Brodsky, R. H.: Am. J. Dis. Child., 46:91 (July) 1933.

5. Jameson, A. B., and Cox, H.: New Zealand M. J., 32:41 (Feb.) 1933.

Bird's-eye view of St. Paul, Minn., where the Seventy-Sixth Annual Session of the American Dental Association will be held, August 6-10.

Eliot, Souther, Anderson and Arnim[6] reported, in 1933, that the administration of vitamin D in infancy reduced the incidence of hypoplastic defects and also to some extent lessened the incidence of caries.

The rôle of vitamin D in the promotion of normal calcification of bones is universally recognized. In addition, as the inorganic constituents of bones are largely calcium and phosphorus, the necessity of an adequate supply of these minerals for normal calcification is obvious. The recent work of Boyd, Drain and Stearns,[7] in which they found a definite correlation between the degree of retention of calcium and phosphorus and the freedom of teeth from decay, would indicate that adequate supplies of calcium, phosphorus and vitamin D are important factors in the formation and maintenance of normal teeth as well as bones. Tooth decay has been markedly reduced by dietary means. Mellanby,[2] Boyd and Drain,[8] Price,[9] Bunting,[10] McBeath,[3] Brodsky,[11] Howe,[12] Jones,[13] Hawkins,[14] Hanke[15] and others have reduced tooth decay by diets which contain large amounts of milk, meat, eggs, vegetables and fruit, and, in many instances, vitamin D. The foregoing articles of food are all rich sources of calcium and phosphorus. It would be reasonable to conclude, therefore, that although there are probably other factors involved, adequate supplies of calcium, phosphorus and vitamin D are important factors in the formation and maintenance of normal teeth.

Fig. 1.—Group I cavity showing as nick in enamel.

It is not generally recognized that a good ordinary diet, containing adequate amounts of milk, meat, eggs, vegetables and fruit, is still deficient in one of the essential food elements, namely, vitamin D. This vitamin is not present in perceptible amounts in fruits and vegetables. The only ordinary foods that contain it

Fig. 2.—Group II cavity showing as nick in enamel with radiolucent zone at dentinoenamel junction.

6. Eliot, Martha M., et al.: Am. J. Dis. Child. (soc. trans.), 46:458 (Aug.) 1933.

7. Boyd, J. D.; Drain, C. L., and Stearns, G.: J. Biol. Chem., 103:327, 1933.

8. Boyd, J. D.; Drain, C. L., and Nelson, M.: Am. J. Dis. Child., 38:721 (Oct.) 1929.

9. Price, W. A.: J.A.D.A., 19:1339 (Aug.) 1932.

10. Bunting, R. W.: J.A.D.A., 18:785 (May) 1931.

11. Brodsky, R. H.: Factors in Etiology and Arrest of Dental Caries, J.A.D.A., 20:1440 (Aug.) 1933.

12. Howe, P. R.; White, R. L., and Rabine, M.: Am. J. Dis. Child., 46:1045 (Nov.) 1933.

13. Jones, M. R.; Larson, N. P., and Pritchard, G. P.: D. Cosmos, 72:439 (May), 574 (June), 685 (July), 797 (Aug.) 1930.

14. Hawkins, H. F.: What Is Cause of Caries and Pyorrhea? J.A.D.A., 18:943 (May) 1931.

15. Hanke, M. T.: J. Nutrition, 3:433 (Jan.) 1931.

are egg yolks, and, to a very slight extent, summer milk and summer butter. It requires approximately 5 egg yolks to furnish the vitamin D equivalent of one teaspoonful of cod liver oil.[16] The amount of vitamin D in summer milk and summer butter is comparatively small; and the fact that infants during the winter months can develop severe rickets while receiving one quart of milk daily indicates that this vitamin is absent, or at least present only in negligible quantities,

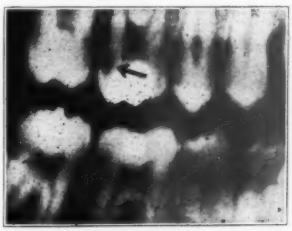


Fig. 3.—Group III cavity showing as nick in enamel with carious zone bellying into dentin toward pulp.

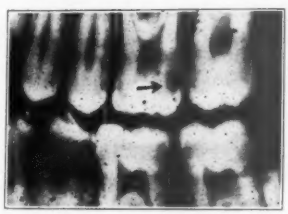


Fig. 4.—Group IV cavity showing as nick in enamel with carious zone bellying well into dentin toward pulp.

in winter milk. Fish oils are, of course, an excellent source of this vitamin, and their use is now universal with small infants and children for the prevention of rickets; but owing to their rather disagreeable taste, and a lack of appreciation of a need of them, they are not generally consumed by the older child or adult.

16. Drake, T. G. H.: Personal communication.

The vitamin D effect of the ultraviolet rays of sunshine is well known. To obtain this effect, it is necessary for the person to be out doors and have the rays fall on the skin. In addition, it has been shown[17] that the vitamin D effect of sunshine during the fall and winter months in the temperate zones is slight as compared to its summer value. A survey of modern methods of living combined with inclement weather, which makes it impossible to expose any considerable portion of the body to the sun's rays, indicates that the average person receives little vitamin D effect from sunshine for the greater portion of the year.

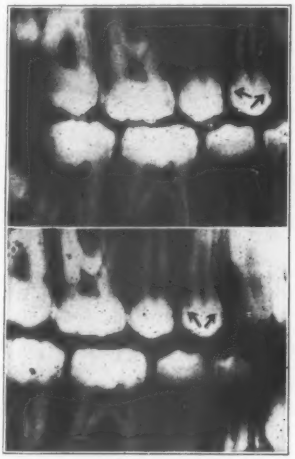


Fig. 5.—Nonprogressive cavities. The lower roentgenogram taken one year after the upper shows no cavity progression.

From the foregoing, it is probable that the average individual living in the temperate zones, although taking a well balanced diet which contains large amounts of calcium and phosphorus, is not receiv-

17. Tisdall, F. F., and Brown, Alan: Am. J. Dis. Child., 34:721 (Nov.) 1927; 36:734 (Oct.) 1928; 42:1144 (Nov.) 1931.

ing the amount of vitamin D necessary for optimal health.

DIETETIC PROCEDURE

In order to obtain further information as to the effect on tooth decay of administering vitamin D to children living under ordinary, good dietetic and hygienic conditions, similar to those which would be encountered in the well-supervised child in the United States, Canada and England, a carefully controlled investigation was instituted in the beginning of 1932. Children in two orphanages were utilized for this investigation. They ranged in age from 2 to 16 years. Their diets were excellent. A typical menu at each orphanage is given in Table 1. It is seen that this diet contains a good supply of milk, meat, eggs, vegetables and fruit. Throughout the year the children spent a considerable time of each day outdoors, and thus got the advantage of exposure to what sunshine was available. The children brushed their teeth twice daily, which was the regular routine at each institution. This routine was not altered in any way during the period of observation.

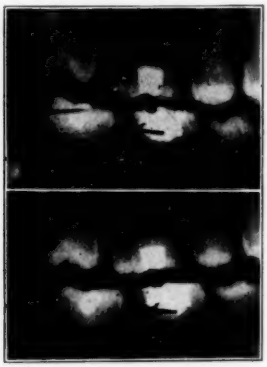


Fig. 6.—Slightly progressive cavities. The lower roentgenograms, taken one year after the upper, shows slight cavity progression.

Each orphanage was divided into two groups, one group continuing on their present diet, the second group receiving exactly the same diet with the addition of 8 drops of 250D viosterol daily. For ease of administration, the vitamin D was incorporated in a plain ginger cookie. The vitamin D content of the cookie was checked periodically by biologic assay. The control group received the same cookie with the vitamin D omitted from it. In this way, it is seen that the only variable factor in the two groups of children was the administration of the vitamin D to the second group.

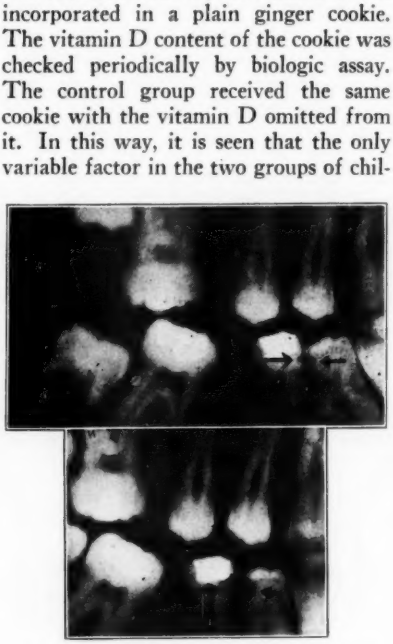


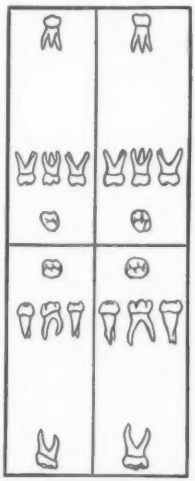
Fig. 7.—Markedly progressive cavities. The lower roentgenogram, taken one year after the upper, shows marked cavity progression.

DENTAL EXAMINATION

The method of dental examination for this study was designed to facilitate the recording of meticulously detailed observations. It was divided into four main phases: the roentgenographic, orthodontic, periodontic and hard tissue examinations. Full length intra-oral and bite wing roentgenograms were made of all

the teeth of every child at the beginning and at the end of the year's study. Impressions of the arches of each child were obtained with "dentocoll" at the beginning and at the end of the study. These have been poured in plaster and are being used in observations on growth, eruption and tooth form, which will be reported at a later date. A report on the soft tissues is being prepared. The hard tissue examination is described in detail below. As a matter of further control, the examiners did not know to which group a child belonged until the examination was completed. Also, each examiner had no knowledge of the findings of the other examiners.

To ensure accuracy in determining the location and extent of the carious lesions,



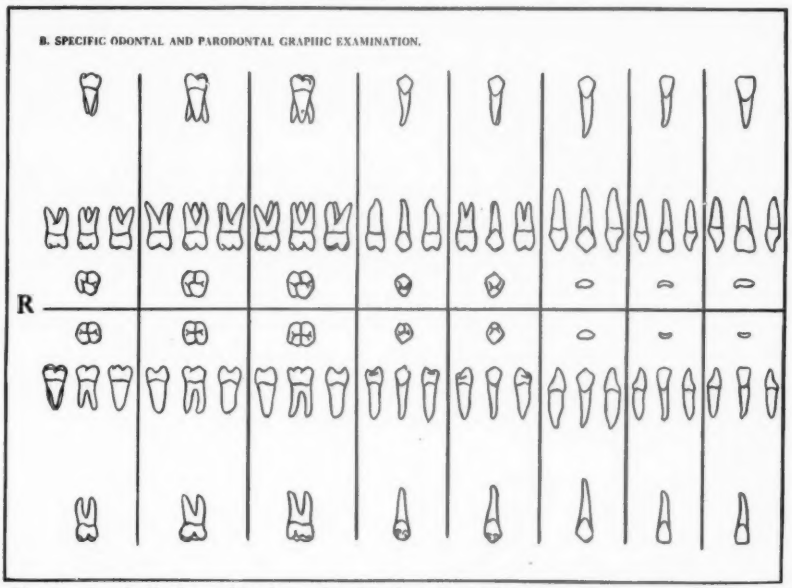


Fig. 8.—One half of graphic chart, showing five views of every tooth for recording of multisurface cavities. At the top is seen the separate overlay sticker, any part or all of which may be pasted over the bicuspid areas to indicate dentures of mixed deciduous and permanent teeth.

bite-wing roentgenograms were used in every case in conjunction with an ocular-instrumental examination at the initial and final observations. Bite-wing roent-

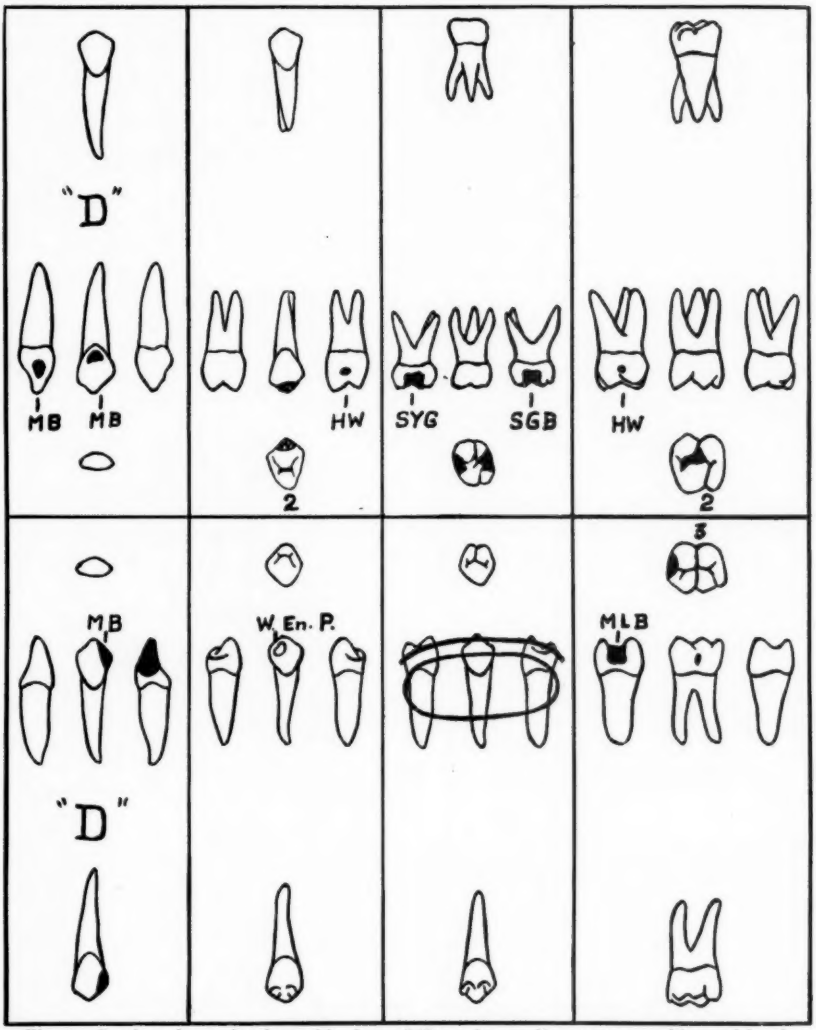


Fig. 9.—Portion of completed graphic chart: *MB,* cavity, medium texture and brownish color; *HW,* cavity, hard and white; SYG, cavity, soft and yellowish grey; *SGB,* cavity, soft and greyish brown; *MLB,* cavity, medium and light brown; *"D,"* deciduous tooth; *checked area,* chipped or broken tooth; *WEnP,* white enamel patch; *oval,* unerupted tooth; *2,* groove 2 (one of the classification [1, 2, 3] according to size); *3,* groove 3 (one of the classification [1, 2, 3] according to size). Fillings are indicated in black without numbers or letters. The upper deciduous second molar is indicated in position on the graphic chart by means of an overlay sticker shown in Figure 8.

genograms were particularly valuable in the detection of cavities of the proximal surfaces, since the ocular-instrumental examination alone is not adequate to detect all incipient carious lesions in this position. Our observations indicate that this procedure is of the greatest importance in determining the incidence of cavity development and progression.

The roentgenographic interpretations were made according to the classification described by Howard R. Raper.[18] By this method, all cavities at each examination were classified as follows: Group I, cavities showing a nick in the enamel (Fig. 1); Group II, cavities showing a nick in the enamel and a radiolucent zone at the dentino-enamel junction (Fig. 2); Group III, cavities showing a nick in the enamel with the carious zone bellying into the dentin toward the pulp (Fig. 3); Group IV, cavities showing a nick in the enamel, the perforation through the enamel and the carious zone bellying well into the dentin toward the pulp (Fig. 4).

Raper says: "These four groups should not be considered different types of proximal cavities, but the same type of cavity in different stages of development." In Figure 5, above, there are two cavities showing as nicks in the enamel at the initial examination, typical Group I cavities. Twelve months later, a second roentgenogram was made (Fig. 5, below), and it is evident that these cavities are still of the same group, or what may be called nonprogressive cavities. In Figure 6, above, there is a cavity of the Group I type. Twelve months later, when a second roentgenogram was taken

TABLE 1.—TYPICAL MENU AT EACH ORPHANAGE*

	S. H. Orphanage	L. T. B. Orphanage
Breakfast	Cereal, such as oatmeal, cornmeal or cracked wheat; milk, 1 to 2 cups; bread and butter; occasionally, fruit.	Cereal, such as oatmeal, cornmeal or cracked wheat; milk, 2 cups; bread and butter.
Dinner	Meat or meat soup or beans; potatoes; one, frequently two, vegetables; rice or raw fruit; milk, 1 cup; bread and butter.	Meat or meat soup or baked beans; potatoes; one, frequently two, vegetables; rice or jelly or raw fruit.
Supper	Macaroni and tomato or macaroni and cheese or egg; scalloped potatoes; fruit or milk dessert; biscuits; milk, 1 cup.	Milk, 2 cups; bread and butter with jam or peanut butter or fruit.

* The average daily milk consumption per child was 24 ounces. From one to seven eggs weekly per child were consumed, depending on the season. Meat was served three to six times weekly. One or two vegetables were served daily in addition to potatoes. Fresh fruit, usually in the form of an apple or occasionally an orange or pear, was served daily for approximately nine months. During the spring and early summer months, this was frequently replaced with dried or preserved fruit.

18. Raper, H. R.: J.A.D.A., 18:716 (April) 1931.

(Fig. 6, below), it is observed that this same cavity has progressed to a Group II type, a slightly progressive cavity. In Figure 7, above, there is a cavity of the Group II type. Twelve months later (Fig. 7, below), this cavity has progressed to a Group IV type. The carious lesion has developed rapidly. It may be called a markedly progressive cavity.

A comparison of the original and final classification for each cavity indicated whether it had been nonprogressive, slightly progressive or markedly progressive, and it was accordingly tabulated in the computation of the results.

The examination charts as shown in Figures 8 and 9 served as the graphic records for each child at each examination for all cavities and other hard tissue conditions. At the initial and final examinations, all cavities, whether revealed by roentgenographic examination or by the ocular-instrumental examination, were carefully drawn on the graphic chart, particular attention being paid to the location, size, shape, color and texture.

TABLE 2.—AVERAGE NUMBER OF CARIOUS CHANGES PER CHILD OBSERVED IN THE DECIDUOUS TEETH OVER A PERIOD OF ONE YEAR

	Control Group (75 Children)	Vitamin D Group (87 Children)
Nonprogressive	3.00	4.67
Slightly progressive	0.05	0.19
Markedly progressive	0.70	0.26
New cavities	0.46	0.22

TABLE 3.—AVERAGE NUMBER OF CARIOUS CHANGES PER CHILD OBSERVED IN THE PERMANENT TEETH OVER A PERIOD OF ONE YEAR

	Control Group (75 Children)	Vitamin D Group (87 Children)
Nonprogressive	3.40	3.65
Slightly progressive	0.20	0.10
Markedly progressive	0.28	0.21
New cavities	1.08	0.47

RESULTS

The findings of the final examination were compared with those of the initial examination. The results obtained are shown in Tables 2-14.

Table 2 indicates that vitamin D exhibits a definite inhibiting influence on the progression of the established cavities in the deciduous teeth; while the number of new cavities per child is less than half

as great in the vitamin D group as in the control group.

Table 3 shows that vitamin D has had but a slight effect in decreasing the rate of progression of the established cavities in the permanent teeth. The incidence of new cavities is less than half as great in the vitamin D group as in the control group. It is of interest in this regard to note that the children on the regular diet of the institutions (control group) averaged 1.5 new cavities per child per year; whereas, the school children in Toronto average 3.0 new cavities per child per year. This reduction from 3.0 cavities to 1.5 cavities is probably the result of the generally

TABLE 4.—AVERAGE NUMBER OF CARIOUS CHANGES PER CHILD OBSERVED IN BOTH DECIDUOUS AND PERMANENT TEETH OVER A PERIOD OF ONE YEAR

	Control Group (75 Children)	Vitamin D Group (87 Children)
Nonprogressive	6.40	8.32
Slightly progressive	0.25	0.29
Markedly progressive	0.98	0.47
New cavities	1.54	0.69

TABLE 5.—PERCENTAGE DISTRIBUTION OF CARIOUS CHANGES PER CHILD OBSERVED IN DECIDUOUS AND PERMANENT TEETH OVER A PERIOD OF ONE YEAR

	Control Group (75 Children)		Vitamin D Group (87 Children)	
	No. of Cavities	Percentage of Total	No. of Cavities	Percentage of Total
Nonprogressive	480	69.7	725	84.9
Slightly progressive	19	2.8	26	3.0
Markedly progressive	74	10.7	42	4.9
New cavities	116	16.8	61	7.2

When the results presented in Tables 2 and 3 are combined, as shown in Table 4, it again appears that vitamin D has been effective in reducing the rate of progression of the established cavities. The average number of new cavities per child in the vitamin D group is less than half the number in the control group. It is excellent diet at the institutions. The beneficial effect of vitamin D here noted (vitamin D group) has therefore been obtained in children already having fewer cavities than the average school child.

In accordance with the method of computation employed by certain other writers, the percentage distribution of the

changes observed was compiled as shown in Table 5. These figures indicate the same proportionate changes as shown in Table 4.

Throughout the period of observation, any cavity which progressed so as to approximate closely the pulp of the tooth was filled by the staff dentists of the institutions. The number of cavities so involved is shown in Table 6.

It was considered that the number of cavities which occurred in teeth which had erupted during the period of observation might be of especial interest. These figures are shown in Table 7. They indicate the beneficial effect of vitamin D on teeth which erupted during the period of observation.

TABLE 6.—NUMBER OF CAVITIES WHICH WERE FILLED DURING THE PERIOD OF OBSERVATION

	Control Group (75 Children)	Vitamin D Group (87 Children)
Number of fillings	32	20
Average number of fillings per child	0.43	0.23

TABLE 7.—NUMBER OF CAVITIES IN NEWLY ERUPTED TEETH

	Control Group (75 Children)	Vitamin D Group (87 Children)
Number of newly erupted teeth	158	220
Number of cavities	7	6
Average number of cavities per tooth	0.044	0.027

STATISTICAL ANALYSIS OF RESULTS

The data obtained through this investigation have been subjected to a critical analysis from a statistical point of view. These calculations by the standard formulas are not difficult, but as the formulas are based upon the laws of chance, it is necessary, before applying them, to be assured that all the variations in the results are due either to chance alone or to the one experimental variable being examined.

All the experimental conditions such as environment, diet, health and care of the children seem to have been alike in the two groups being compared, and, from Table 8, it is seen that they are similar in respect to the number of children, number of teeth per child, proportion of teeth which were deciduous and number of old carious processes present at the beginning of the survey. Therefore, a statistical comparison of the results is justified.

The number of cavities and fillings found in a child at the first examination was expected to be a reasonable index of the susceptibility of the child toward the development of new caries. In order,

TABLE 8.—DISTRIBUTION ACCORDING TO AGE

Ages	Number of Children		Number of New Cavities per Child		Percentage of Children with New Cavities		Number of Markedly Progressive Cavities per Child		Number of Cavities and Fillings per Child at First Examination		Percentage of Teeth (Deciduous)		Number of Teeth per Child	
Years	Control Group	D Group	Control Group	D Group	Control Group	D Group	Control Group	D Group	Control Group	D Group	Control Group	D Group	Control Group	D Group
3–4	3	3	0	1.3	0	67	0	0.3	3.7	11.0	100	95	20	21
5–6	8	10	1.6	0.2	63	10	3.0	0.3	11.5	10.6	77	83	21	21
7–8	11	16	2.0	0.5	100	31	1.5	0.5	13.7	17.3	51	45	21	21
9–10	9	21	1.8	0.4	78	29	0.2	0.3	14.4	12.2	22	28	21	23
11–12	21	25	1.5	1.0	57	36	0.6	0.8	9.0	12.9	7	7	25	25
13–14	16	9	1.8	1.2	69	78	0.9	0.4	13.1	12.1	0	1	27	26
15–16	7	3	1.3	1.3	71	67	0.6	0.3	16.0	13.0	0	0	26	27
	75	87	1.5	.7	68	37	1.0	0.5	12.0	12.9				

TABLE 9.—DISTRIBUTION ACCORDING TO THE NUMBER OF CAVITIES AND FILLINGS PRESENT AT THE FIRST EXAMINATION

Number of Cavities and Fillings per Child, Originally Present	Number of Children		Number of New Cavities per Child		Number of New and Markedly Progressive Cavities per Child		Percentage of Children with New or Markedly Progressive Cavities	
	Control Group	D Group	Control Group	D Group	Control Group	D Group	Control Group	D Group
0	4	0	0	.....	0	.....	0	.....
1–4	8	14	0.6	0.5	0.6	0.6	38	43
5–8	16	13	1.0	0.5	1.6	1.1	56	31
9–12	11	20	1.5	1.0	2.5	1.5	82	45
13–16	16	14	3.1	1.0	3.9	1.4	94	50
17–20	9	8	1.6	0.8	3.3	1.9	67	88
21–24	6	11	1.7	0.6	2.8	1.1	83	27
25–29	3	6	2.0	0.5	3.0	1.4	67	67
30–up	2	1	.....	.....	.....	.....	.....	.....

TABLE 10.—STATISTICAL SIGNIFICANCE OF AGE GROUP RESULTS

Ages	D Group or Control Group	Number of New Cavities per Child (Average)	Standard Deviation of Average	Difference Between Means Divided by Standard Deviation of Difference = x/σ	Statistical Significance of Difference
3–10	D	0.44	±0.11	4.1	+
	Control	1.64	±0.27		
11–16	D	1.11	±0.23	1.0	0
	Control	1.55	±0.35		
		Number of markedly progressive cavities per child (average)			
All ages	D	0.5	±0.11	1.6	0
	Control	1.0	±0.30		
		Percentage of children with new cavities		P by chi square test. $P = \frac{x}{\sigma}$	
3–10	D	28		4.0	+
	Control	74			
11–16	D	49		1.5	0
	Control	64			

therefore, to compare the relative initial susceptibility to caries of the two groups, Table 9 was prepared, showing the distribution of the children in relation to this factor. It is obvious that the two groups are similar in this respect. The table also shows that the development of new cavities or the progression of old ones is no more liable to occur in children and various other attributes have been calculated for each age group separately. There are more children taking vitamin D than children acting as controls in the younger groups and fewer in the older, and it is obvious that the favorable effect of the vitamin in reducing the number of new cavities per child, and in reducing the proportion of children in which new

TABLE 11.—DECIDUOUS AND PERMANENT TEETH

Type	Ages	Group	Average New Cavities per Tooth	Standard Deviation of Average	Difference Between Averages Divided by Standard Deviation of Difference $= x/\sigma$	Statistical Significance of Difference
Permanent	3–10	D	0.009	±0.004	3.0	+
		Control	0.050	±0.013		
	11–16	D	0.041	±0.008	1.7	0
		Control	0.061	±0.009		
Deciduous	3–10	D	0.034	±0.009	3.5	+
		Control	0.100	±0.017		
	11–16	D	0.045	±0.037	0.2	0
		Control	0.054	±0.032		

TABLE 12.—FAMILY INFLUENCE

Group		Number of Children	Number of New Cavities per Child	Percentage of Children with New Cavities
Divided Families	D	30	0.67	40
	Control	34	1.56	71
Remainder	D	57	0.75	37
	Control	41	1.63	68

with twenty-five cavities than in children with six or seven. There is some indication that the children with less than four or five cavities were relatively immune to new caries.

Examination of the results from the point of view of age distribution demonstrates the importance of age. These figures are given in Table 8, in which the number of children, new cavities per child cavities developed, is striking in the younger children only. To average the results for all the children thus falsely minimizes the differences found in the younger group and falsely exaggerates the differences found in the older groups. Consequently, in determining the statistical significance of the results, the children have been divided into two groups, ages 3 to 10, and 11 to 16. The results of

these calculations are given in Table 10.

The expression "standard deviation" represents the range within which the results of two out of three similar experiments should lie. The term "probable error," which is much used, is two thirds of the standard deviation and represents the range within which only one-half such similar experiments would lie. The expression $\frac{x}{\sigma}$ enables us to decide upon the significance of the results. Most authorities state that $\frac{x}{\sigma}$ must be 3.0 or more to ensure statistical significance, but even should it be as low as 2.6, the chances are about 100 to 1 that the difference between the averages being compared is real and not due to chance alone.

It will be seen from Table 10 that from a statistical standpoint the strikingly

Table 13.—Influence of Sex: New Cavities per Child

Sex	Age	Group	Number of Children	Average Number of New Cavities per Child	Standard Deviation of Average	Difference Between Averages Divided by Standard Deviation of Difference = x/σ	Statistical Significance of Difference
Boys	3–10	D	23	0.37	±0.14	3.0	+
		Control	16	1.75	±0.43		
	11–16	D	12	0.83	±0.46	1.1	0
		Control	25	1.44	±0.29		
Girls	3–10	D	23	0.52	±0.8	2.2	?
		Control	14	1.36	±0.35		
	11–16	D	25	1.24	±0.26	0.05	0
		Control	19	1.26	±0.29		

Table 14.—Influence of Sex (Children with New Cavities)

Sex	Age	Group	Percentage of Children with New Cavities	Chi Square Test $P = x/\sigma$	Statistical Significance of Difference
Boys	3–10	D	26	2.7	+
		Control	69		
	11–16	D	33	1.8	0
		Control	64		
Girls	3–10	D	26	3.1	+
		Control	79		
	11–16	D	60	0.3	0
		Control	68		

favorable effects of vitamin D in the children from 3 to 10 years old is definitely significant. Over the age of 11 there is no real difference in the number of new cavities per child related to vitamin D, and no significant one in the proportion of children developing new cavities. The apparent reduction by the vitamin of the number of markedly progressive cavities per child is not statistically sound, though of course it may exist. As seen from Table 6, several cavities were filled during the year of observation. It has been impossible to determine how many of these should be included in the markedly progressive class, but if all were included,

SPECIMEN MENU
Stanley Trumble, aged 13 years.

Date	Breakfast		Dinner		Supper		Recess Milk
		Gm.		Gm.		Gm.	Gm.
March 27	Rolled wheat	530	Vegetable soup	346	Bread & butter	157	248
	Bread and butter	67	Rice pudding	338	Cake	100	
	Milk*	245			Milk	237	
March 28	Rolled wheat	496	Marcaroni	141	Bread with		249
	Bread and butter	47	Salmon	243	peanut butter	143	
	Milk	253	Potatoes	279	Milk	236	
			Prunes	83			
March 29	Whole wheat	419	Irish stew (consisting of meat, onions, parsnips, potatoes, carrots, etc.)	270	Bread and jam	168	248
	Bread and butter	89			Milk	256	
	Milk	268	Tapioca pudding	283			
March 30	Whole wheat	535	Fish	222	Vegetable soup	160	None
	Bread and butter	142	Potatoes	134	Bread & butter	148	
	Milk	258	Hot cross buns with butter	66	Milk	253	
March 31	Whole wheat	546	Spinach	86	Bread & butter	142	None
	Bread and butter	106	Potatoes	220	Milk	233	
	Milk	243	Cold meat	52			
			Orange (peeled)	84			
April 1	Bread and butter	181	Bread and butter	120	Currant bread		None
	Milk	256	Eggs	112	and butter	161	
			Jam tarts	82	Fancy bun	50	
			Ice cream	24	Milk	248	
					Ice cream	57	
April 2	Whole wheat	532	Beans	200	Currant bread		None
	Milk	254	with butter sauce	74	and butter	162	
	Bread and butter	89			Milk	253	

* The total weekly milk intake of 4,238 gms. (28.5 gms. per ounce) = 148 ounces, or 21 ounces daily. In addition, some milk was used in the cooking.

as would be reasonable, it would make it probable that vitamin D has significantly reduced the number of markedly progressive cavities.

Consequently, the number of new cavities per tooth has been determined for the deciduous and permanent teeth separately. This basis of calculation was

SPECIMEN MENU
George Gallagher, aged 8 years

Date	Breakfast	Gm.	Dinner	Gm.	Supper	Gm.	Recess Milk Gm.
March 13	Cereal	327	Meat	68	Bread and		226
	Milk*	239	Turnips and		butter (2½)	114	
	Bread and		potatoes	336	Cake	103	
	butter (1½ slices)	80	Gravy	22	Milk	246	
			Bread	12			
			Orange (no peeling)	68			
March 14	Cereal	384	Potatoes	120	Bread and		230
	Bread and		Cabbage	65	peanut butter	129	
	butter (1½ slices)	21	Turnips	42	Milk	260	
	Milk	241	Meat	39			
			Gravy	63			
			Baked apple	197			
March 15	Cereal	410	Curry minced	130	Bread and jam	165	249
	Bread and butter	72	Scalloped		Milk	246	
	Milk	262	potatoes	290			
			Bread (½ slice)	18			
			Apple	158			
March 16	Cereal	315	Pastry	78	Bread & butter	126	233
	Bread and butter	53	Meat pie	441	Milk	254	
	Milk	233	Baked apple	130	Biscuits	26	
March 17	Cereal	303	Beets	162	Bread & butter	109	None
	Bread and butter	60	Potatoes	310	Milk	243	
	Milk	235	Cold meat	68			
March 18	Cornflakes	24	Irish stew (consisting of meat,		Milk	224	None
	Bread and butter	109	potatoes, carrots,		Currant bread		
	Milk	240	etc.)	407	and butter	139	
			Jelly with fruit	85			
March 19	Cereal	338	Baked beans		Bread and jam	165	233
	Bread and butter	59	with tomatoes	330	Milk	250	
	Milk	260	Figs	30			

* The total weekly milk intake was 4,404 gms.: i. e., 154 ounces, or 22 ounces daily. In addition some milk was used in the cooking.

This influence of age immediately suggests that perhaps vitamin D protects the deciduous teeth, but not the permanent.

adopted as most mouths contained both kinds of teeth, and consequently the averages would be improperly weighted, if

figured on a per child basis. The results are given in Table 11, from which it is obvious that ingestion of vitamin D is effective in reducing the new cavity formation equally, in either deciduous or permanent teeth, in the younger children. The reduced effectiveness of vitamin D in the older children cannot be related to the absence of deciduous teeth.

Another factor has been explored, namely, the possibility that the various members of a family might all show the same trend, irrespective of the presence or absence of vitamin D. This is not so,

SPECIMEN MENU
Muriel Stark, aged 6 years

Date	Breakfast	Gm.	Dinner	Gm.	Supper	Gm.	Recess Milk
April 24	Milk*	243	Irish stew	176	Bread & butter	72	Gm. 226
	Whole wheat bread	292	Bread pudding	136	Cake	74	Bread
	and butter	46			Milk	238	and butter 13
April 25	Milk	227	Beef	80	Milk	257	Milk 226
	Whole wheat bread	151	Gravy	88	Bread and		
	and butter	29	Vegetables	109	Peanut butter	110	
			Carrots	98			
April 26	Milk	231	Peas	169	Fruit	92	220
	Whole wheat bread	318	Potatoes	100	Bread	96	
	and butter	60	Bacon	43	Milk	231	
April 27	Milk	231	1 boiled egg		Bread & butter	108	231
	Whole wheat bread	180	Creamed sauce	36	Milk	235	
	and butter	54	Potato	142	Cake	68	
			Bread pudding	145			
April 28	Milk	218	Peas	197	Bread & butter	102	249
	Whole wheat bread	211	Potato	248	Milk	234	
	and butter	54	Meat	35			
			Gravy	23			
April 29	Bread	100	Vegetable soup		Currant bread		
	Milk	229	(thick, consisting of carrots, potato, barley, onions)	247	and butter	103	
					Milk	227	
			Pie (jam)	134			
April 30	Milk	227	White beans	280	Bread and Jam	115	220
	Whole wheat bread	195	Sauce (butter)	88	Milk	242	
	and butter	45					

* The total weekly milk intake was 4,642 gms.: i. e., 162 ounces, or 23 ounces daily. In addition some milk was used in the cooking.

as will be seen in Table 12, which fails to show any such familial effect. Twenty-one families were found to be represented in both the D and control groups by sixty-four children, evenly divided as to age. These constitute the group called "divided families" in Table 12, while the remaining ninety-eight children of the experiment make up the group called the remainder. It is obvious that vitamin D was as effective in reducing the incidence of new caries in the family group as in the remainder.

The possibility that the sexes might react differently to vitamin D has also been explored as shown by the figures in Tables 13 and 14. It will be seen that the number of new cavities per child and the effect of the ingestion of vitamin D is the same in both sexes, except that there is an apparent reduction in new cavity formation by vitamin D in the boys 11 to 16. This apparent beneficial action of the vitamin is not statistically certain and consequently must be considered only as a possibility.

In three of the foregoing analyses, there have been figures suggesting that vitamin D has had some effect in reducing new cavity formation in older children. These are found in Table 10, percentage of children with new cavities; Table 11, new cavities per tooth in the permanent teeth of the older children; and Table 14, children with new cavities, boys 11 to 16. No one of these figures alone is statistically certain, but each is suggestive, and, taken as a whole, the three together indicate that vitamin D has probably reduced to some extent the new cavity formation in the older children, particularly in boys.

The results of the foregoing statistical analysis may be summarized as follows: 1. The number of cavities originally present is not an index of susceptibility to new cavity formation. 2. The effect of vitamin D in reducing the number of new cavities per child and in reducing the number of children who develop new cavities has been shown to be striking in the children from 3 to 10 years of age, but not statistically significant in those from 11 to 16 years. 3. Vitamin D is equally effective in reducing the new cavity formation in deciduous and in permanent teeth. 4. The apparent reduction in the number of markedly progressive cavities by vitamin D is not statistically sound. 5. The favorable effects of vitamin D were as apparent within the family group as in children not within family groups. 6. The two sexes reacted similarly to vitamin D, except that there is evidence that the older boys respond better to the vitamin than the older girls.

CONCLUSION

The administration of vitamin D in the form of irradiated ergosterol to children living under good hygienic and dietetic conditions markedly decreased dental caries.

ORAL ROENTGENOLOGY AND ITS POSSIBILITIES*

By LE ROY M. ENNIS, D.D.S., Philadelphia, Pa.

NOT long ago there came to consult a roentgenologist two men, a dentist and a physician, each of whom had a seemingly good practice in his profession in a fairly populous community.

Presenting two very fair looking roentgenograms of the right maxillary bicuspid region that showed in succession a full complement of teeth, and then a film indicating the recent removal of the second bicuspid, they related the case: A young woman, aged 21, had been suffering from what the physician had diagnosed as a form of arthritis. The dentist made the roentgenograms and the film to them indicated a condition of the second bicuspid that might have contributed to the condition. Therefore the tooth was extracted.

But, the suffering of the young patient meeting no amelioration, it was determined to remove the first bicuspid, which to both dentist and physician seemed to show a condition warranting the course.

The only obstacle to the plan was the protest of the tearful owner that the first removal effected no relief, and, with no greater assurance from the projected second extraction, she was not going to undergo the immediate loss and the consequent cross of a larger bridge for the balance of her life without better promise as to when and where the extractions were to end.

An easily arrived at interpretation of the film indicated no pathologic condition to justify the extraction of the first bicuspid. To the contrary, it showed a strong, normal structure with good pulp, free of caries and any trace of degenerated tissue, abscess or doubtful physiologic appearance, save a natural, or at least not unusual, calcification surrounding part of the apical region and met many hundreds of times in our regular practice.

One not pretending to superior attainments in the field could have interpreted the film. Yet that innocent and vital tooth would have been extracted save for the opposition of the patient.

The more serious side of the situation lies in the fact that the second bicuspid, which had been extracted in vain as far as the accomplishment sought by its removal is concerned, was of even better structure, its surrounding tissues being unquestionable. The roentgenogram confirmed this deduction.

This case typifies hundreds met in my own experience; and it probably represents thousands encountered by many attending this convention. Multiply the number by any figure and you may approximate the woe that follows in the wake of inaccurate interpretation of even ample roentgenograms and of faulty application of an interpretation of improperly produced films.

Thousands of cases there are wherein the less careful and the less trained observer attributes as a sign of infection shadows in a roentgenogram that to the

*Read at the Seventy-Fifth Annual Session of the American Dental Association in conjunction with the Chicago Centennial Dental Congress, Aug. 9, 1933.

capable clinician show a normal condition or, at most, the slightest deviation from the normal, but which indicate neither infection nor a condition contributing to infection. Perhaps a much greater number of cases there are wherein the practitioner fails to recognize shadows portending danger or to observe evident abnormalities that indicate infection or threaten to result in or produce infection.

Following the orgy of extracting teeth indulged in a few years ago, there are still too many good and vital teeth removed by dentists who hold themselves out as capable, and not only of the mercenary cult that sees in extraction the fatter return from the making and sale of appliances. Physicians are still prone to blame the teeth for all human ills failing to respond to orthodox or inexpert medical treatment; and so the tooth that the dentist could not observe was harmless and that the physician could not diagnose as uninfected comes out. And the plight of the patient is pathetic, to apply no more condemnatory term to the ignorance that permitted it.

But to the myriads of cases wherein the flagrant ignorance of dentists allows serious conditions of the teeth and tissues of the oral cavity to persist for years without warning or attention, the only word applicable is tragic. In this year of grace, no excuse is offerable for thousands of infections remaining unnoticed until immediate surgical operation is required. The past ten years have given successive suggestions as to the care of the teeth and ample admonitions as to the dangers of neglect, placing within our grasp the knowledge and the instruments through which to discover oral conditions calling for treatment to protect health; and the dentist who deliberately or carelessly refuses or neglects to employ every known instrumentality and method to detect indications of disease, who sidesteps science because of an inability or an ineptitude to keep abreast of the modern speed of progress, who continues following the hit-or-miss system of treating suspicious symptoms instead of searching for and treating causes, who, in fine, is smugly satisfied with anything less than the most comprehensive method of diagnosing the ills to which the constituent parts of the mouth are subject, is unfair to the patient, the public and the profession.

The oral surgeon views many cases that may not often come within the purview of general dental practice; but it would surprise many were the surgeon to mention the number of cases that might have been saved his scalpel and lancet had the dentist but employed early the ordinary safeguards and methods of examination that lay as close to hand as do our elevators, mirrors and explorers.

That a thorough, full-mouth examination of everyone seeking the services of the dentist is necessary has been proved by recent research and by very specific confirmation of scientific theories; and to convince the patient of this is the inescapable responsibility of the practitioner. For where teeth exist or existed, there lies not only the safeguards of health, but also, though so often deeply hidden, undiscerned dangers to health.

We understand now how in the unexplored and, except for experimental surgery, well-nigh unexplorable maxillary and mandibular structures lay for years undiscovered foci of systemic infection. We had wondered as to what undisclosed conditions might lie beneath the surface, often exploring just short of anything of informative value. No clinical test revealed more than a justification for further guesses. And when later we noticed arising from a hitherto unsuspected area a dangerous condition, and one development of which consumed not days or months, but years, we bemoaned our helplessness and hoped for knowledge to insure earlier recognition of danger signs

and for better methods of diagnosis and better systems of determining the etiology of dental diseases. And through the pioneers in all fields of dental science whose study and struggles have made dentistry the honored profession it has become, science responded. Wilhelm Konrad Röntgen announced the discovery of the outstanding and striking property of the cathode rays, his own named "x-rays," through which, as compared to the darkness wherein dentistry labored before this discovery, the miracles of yesteryear are the routine of present practice.

Even the younger generation of the profession have seen the infancy and growth of this specialty, and thanks to the interest these younger men have evinced, the application of roentgen rays in general practice has proved the greatest boon that has come to civilization since the offering of anesthesia. Those now coming into the profession are recognizing the roentgen rays as the very support that dental science has sought these many years, for they have proved the most dependable aid the clinician can summon when in doubt.

There was difficulty encountered in securing the recognition of the value of the roentgen rays by the more experienced members of the profession. Dentists and physicians, like some business men who feel their success measured by their income and are too satisfied to consider changing either methods or standards, cling to old ideas and old ideals, smugly unaware that these were being relegated to the dust heap by the progressive and scientific world. Their preconceptions are rooted very deep, and inertia deters them from an effort to understand the newer ideas; but a few years hence will see them superseded in the estimation of patients and the public by the younger men who are keenly alive to the thrilling experiences that are making dentistry so important and so progressive a science.

Many here have probably had an opportunity similar to the one it has been my good fortune to have enjoyed. For the past five years, each student entering Drexel Institute, Philadelphia, has been given a thorough medical and dental examination. Drexel Institute is a school comparing with the average smaller college, with students of the average age and average intellectual grasp, and of the average family connections and environment that attach to the general run of college matriculates of both sexes.

There has been a progressive improvement in the system of making these examinations from year to year, for, when originated, the plan comprehended merely the superficial clinical survey of the teeth, the idea being limited to a report on the more or less obvious conditions. The medical examiner had no small task in his own particular broad field. He was anxious to complete the examinations quickly and the number of students requiring attention led him to present his first report to the faculty at the earliest possible moment in order to permit formulation of plans for the dental or medical treatment necessary. Therefore, it was ordered that only teeth justifiedly suspicious should be examined roentgenographically.

This was a system much less than adequate; and it required little argument to convince the medical examiner that his records would prove but a part of what he sought to show. His final report confirmed this fact so fully that, in the following year, and since then annually, a comprehensive clinical and roentgenologic full-mouth examination has been made of all freshmen.

The average age of these students is 18, and the questionnaire answered by them seems enlightening as more than half replied that they had visited the family dentist for examination or for some specific treatment within one month

to six months just prior to leaving home for college.

Eleven hundred and twenty-seven students formed the first group examined in 1929; males, 723, and females, 404. Only teeth suspected of periapical involvement were roentgenographed, and of the 723 males examined, only 200 proved free of caries under the rather limited method followed. Five hundred and twenty-three of these young men, ambitious to attain an education, interested in preserving health and knowing the importance of a sound body for a reasoning mentality, carried in their mouths the well springs of disease, of which they were totally unaware and which were as threatening as poisoned and polluted springs supplying drinking water to the home. Seventeen hundred and twelve cavities were discovered, not to mention 691 missing teeth that should have been replaced by substitutes to protect complementary vital teeth, in danger of earlier degeneration were such action deferred unduly.

But only 294 of these 723 mouths were examined roentgenographically, because, to repeat, this method was applied only to those conditions indicating periapical involvement; yet in these 294 cases, there were disclosed 249 carious conditions that the mirror and instrument failed to find.

A full roentgenographic examination of every mouth would have disclosed much that the method employed had missed; but that approximately 85 per cent of the mouths examined by the roentgen rays exhibited conditions probably more dangerous than those treated by the family dentist just a few short months earlier cannot be a happy thought for those same dental practitioners to contemplate, particularly with the possibility of these young students returning to the home town with the report that Dr. Slipshod or Dr. Careless certainly overlooked some menacing conditions when pronouncing the patient perfect, with no oral condition to worry him or hinder his studies. And that is a threat that hangs over the heads of all who are satisfied with only the merest clinical examination of the teeth of a patient, and the threat grows larger each day.

The 249 definite carious conditions so discovered constitute a sufficient justification for the roentgenographic examination; but, in addition to these conditions, there was undetected by the clinical tests but discovered by the roentgen rays in the same 294 mouths, more than 100 cases of granuloma, one cyst, fourteen residual roots, ten well-developed cases of periostitis, and thirty-eight instances of root absorption; conditions that should have been treated earlier.

Nor is it amiss to interpolate here a rather illuminating presentation of data showing the results of the roentgenographic examination of twenty-five young ladies constituting the class in oral hygiene in the Dental Department of the University of Pennsylvania, this year. It

TABLE 1.—COMPARISON OF CLINICAL AND ROENTGENOGRAPHIC FINDINGS, SHOWING THE RESULTS OF ATTEMPTING TO PREDICT THE PRESENCE OF GRANULOMA FROM THE CLINICAL APPEARANCE OF TEETH

	CASES	TEETH
Granuloma suspected clinically; found by roentgen rays	91	106
Granuloma not suspected clinically; found by roentgen rays	100	126
Total number of granulomas	232	
Granuloma suspected clinically; not found by roentgen rays	333	495
Percentage of proved granulomas suspected clinically	45.2	
Percentage of suspected teeth showing granuloma	17.6	

is unnecessary to recite the educational qualifications these students are required to possess, but they are extensive. More, these students are certainly interested in the maintenance of their own teeth, and surely since first contemplating the field they subsequently entered, they had probably looked after them more zealously than the average person looks after the teeth. Nor should we lose sight of the fact that many of the young ladies entering the course are the daughters, sisters or close relatives of dentists.

The mouths of these embryo oral hygienists should show a healthful state, a well-attended set of teeth, an absence of infection and threatening growths. But the films, checked and rechecked with the greatest care and certitude, disclosed among the twenty-five students these conditions:

Caries	79
Rarefying osteitis with granulation tissue	12
Impactions	13
Root absorption	1
Condensing osteitis	1
Perforated root	1
Residual roots	1
Retained teeth	15
Missing teeth	41

With such impressive data collected from sources of unmistakable knowledge of the value of hygienic and healthful oral conditions, we may pause to consider the gravity of conditions that might be found generally among people in all walks of life were every inhabitant of our city subjected to a similar examination.

To revert to the result of the examination of the Drexel Institute students, but avoiding the detailed statistics pertaining to the 160 young women selected to undergo the roentgen-ray examination, let it suffice to state that the roentgenographic survey revealed a great amount of infection or pathologic lesions that clinical examination did not disclose and never would have disclosed.

So startling were the revelations among both male and female groups that the school authorities determined quickly on a complete roentgenographic examination for all future freshmen on entering college.

The examination of the class that entered last September revealed a greater prevalence of caries than the average found in earlier classes studied; but as to other conditions, practically similar proportions of infectious conditions were found as those prevailing in preceding classes. The excess of caries may be attributed to the economic conditions of the past three or four years. Less than sufficient dental treatment might easily be incident to the depression.

There is much to ponder over in reviewing the figures just offered. To approach a consideration of conditions shown, it may easily be conceded that some of the students failed to adhere strictly to the truth when, during the examination, they were asked, "When did you last have the services of your dentist?"; for too many replied, "Just prior to my departure for school," to deserve complete credence; for the

TABLE 2.—INCIDENCE OF ELECTROCARDIOGRAPHIC CHANGES IN 160 WOMAN STUDENTS WITH AND WITHOUT DENTAL GRANULOMA

	With Dental Granuloma		Without Dental Granuloma	
	Number	Per Cent	Number	Per Cent
Women electrocardiographed	27		133	
Normal tracings	23	85.2	109	82
Tracings showing some departure from normal	4	14.8	24	18

plainly evident conditions observed through the mirror alone negatived many of these assertions and gave reason to suspect the credibility of the student.

But the veracity of the student becomes an issue only when considered with the lesson the entire picture presents: If the conditions discovered among these students seem as threatening to you as they seem to me, and also to John H. Arnett, the medical director, and the faculty of the Drexel Institute, how are we to protect the growing generation against similar danger? For it is logical to deduce that similar conditions exist all over the country. It is a fair assumption that there would be even more pronounced findings among younger persons not preparing for further studies and not undergraduate college students or prospective oral hygienists. And among older persons, it may be said confidently, the infectious conditions that a complete examination would disclose might be double or treble the number found among college and university freshmen.

TABLE 3.—SEX AND AGE OF SUBJECTS

Age	Women	Men	Total
16	9	12	21
17	76	83	159
18	158	153	311
19	67	100	167
20	26	73	99
21	6	29	35
22	6	27	33
23	3	14	17
24	1	5	6
25	0	2	2
Over 25	5	4	9
Age not stated	24	0	24
Total	381	502	883

Every school and college will soon be doing what has been tried at Drexel Institute. Institutions not so well equipped with forces to handle the examinations will require either a complete report from the dentist who latest examined the student or a report from some reliable dentist in the college town. And accuracy will be expected of these examinations. Let dentists attend that no discoveries be made to discredit the profession.

Table 3 presents data on sex and age drawn from the examination of one freshman class of 833 students at Drexel Institute when 27,398 teeth were under observation, in 2,797 of which caries was revealed.

While the combined clinical and roentgenologic examinations disclosed 3,034 carious spots, the clinical method revealed only 1,662. The roentgen-rays revealed 1,372. The roentgen-ray and clinical examinations agreed only in 237 cases, which represent the comparatively small proportion, about 10 per cent, of the carious conditions revealed, which was duplicated by the joint disclosures. (Table 4.)

And if, however often we repeat a similar experiment on a large group of people, our findings approximate such a result, it is evident that to exclude either of these methods in examining teeth is to shirk responsibility. Not only is there a responsibility upon the dentist to examine roentgenologically the clinically suspicious teeth, but also that attention should be given to the entire mouth, the teeth and edentulous areas that have no obviously suspicious appearance.

In the tables presented, regardless of the number of cavities, a tooth was counted as but one carious tooth. Sound filled teeth are not included.

For no longer is the chief concern of the dental profession merely repair, replacement, the treatment of the obvious. Prevention of disease looms as important, and the sphere of the dentist embraces completely the minutely conceived function of prophylaxis. We know of systemic diseases originating in caries and other hidden areas of oral putrefaction.

We concede the deleterious influence of septic teeth and tissues; and we dare not ignore an agency offering to disclose such foci of infection. To the contrary, we must have such an agency close at hand to locate and determine quickly where abnormal conditions exist. Roentgenographic equipment should be had in every office.

No extravagant claims are advanced in favor of this conviction, and none need be, for the self-evident truths proclaim to the world sufficient reasons, the incalculable value of the instrument. Of course, the roentgen rays miss many existing conditions. Caries may be in such a position in the crown of the tooth as to escape the roentgen rays, and they will miss other danger spots that the explorer reveals; but without them we miss chronic lesions, such as the granuloma and the cyst, absorbed roots, and many other hidden sources of danger, discovery of which is the duty of every dentist. Without the roentgenographic examination, we miss the assurance that comes from adopting the most scientific system of prophylaxis, of healing, of cure which modern methods demand that we follow for the fullest protection of the patient.

TABLE 4.—DENTAL CARIES (COMPARISON OF CLINICAL AND ROENTGEN-RAY FINDINGS)

	Teeth
Caries revealed by clinical examination	1,662
Caries revealed by roentgen rays	1,372
Roentgen-ray and clinical examinations agreed	237
Caries revealed clinically, but not by roentgen-rays	1,425
Caries revealed by roentgen rays but not clinically	1,135

TABLE 5.—FREQUENCY OF DENTAL CARIES AS DETERMINED BY COMBINING CLINICAL AND ROENTGEN-RAY FINDINGS

Number of students examined	883
Number of students showing caries	733
Percentage of students showing caries	83
Approximate number of teeth examined	27,398
Number of teeth with caries	2,797
Percentage of teeth showing caries	10.3
Average number of carious teeth per student	3.2

TABLE 6.—FREQUENCY OF GRANULOMA AS DETERMINED BY USE OF ROENTGEN RAYS*

Number of students examined	883
Students showing granuloma	175
Percentage of students showing granuloma	19.8
Approximate number of teeth examined	27,398
Number of teeth showing granuloma	232
Percentage of teeth showing granuloma	0.8

*Further information regarding this particular group study is presented in the American Journal of the Medical Sciences and the Dental Cosmos, June, 1933.

Public schools, the radio, the newspapers have carried on widespread educational campaigns regarding the dependence of health on good teeth, and the preservation and retention of vital teeth. Hence, the growing opposition to extractions except as a last resort and the insistence of the patient on the use of the roentgen rays even after the attending dentist advises extraction. In many cases,

the sufferer secretly visits the roentgenologist before submitting to extraction of the teeth. Note how the advertising dentist features the roentgen-rays in his publicity as a sign of advance, of modern methods, and how his patients are harangued into believing that every patient should undergo such an examination; and we must concede that, in theory, the argument has reason.

With dentistry the first support of modern medicine to stem the flood of systemic disorders undermining mental and physical health, it behooves the profession to put its house in order if it is to be a potent agency in preventing infection that may ultimately spell death. We cannot stand by until forced to recognize the presence of sepsis, when the barest outlay of time and money would have detected the infection and could have aborted or eliminated it before it invaded deeper tissues and the blood stream.

Dentists must preach the gospel of a full-mouth roentgenographic examination for every patient, the records to be retained by the dentist and filed for future reference. The principles of prophylaxis commend the idea. It is the logical evolution of dental science toward decreasing dental disease; and in the revelation of pathologic lesions and their location, area and extent, there would be a lessening of operative labor.

While monetary considerations should hold no place in our discussion, it may be ventured that the equipment once owned, the small cost of roentgen-ray films adds little to the carrying charges of any office. In fact, instead of an expense, the making and use of roentgenograms will show a profit; for they contribute to building a practice, uncovering conditions that would otherwise remain unrevealed and so untreated. Think of the time, trouble, worry, uncertainty saved when absolute certainty may be had for the mere asking, the mere matter of the attention called for in the study of roentgenographic technic.

No separate charge should necessarily be made patients for the service, whatever system of charges might be followed in an office; and this for several reasons: the service should be as incidental to the examination of a patient as is now the very first glance given a worrisome tooth or other trouble about which the dentist is consulted; and the natural reaction of the patient against individual fees for specific necessary treatment should be considered. There should be the desire to impress patients with the fact that the service is routine practice of the office, and not extraordinary, and that the resulting film is for our own knowledge and information and is not the property of the patient to display to his family and friends.

There seems no better reason to ask a separate fee for such an examination than there would be for the use of pulp testers and transilluminators in making a clinical study, and for the wear and tear on engines and explorers. And here it seems pertinent to quote from an article by L. M. Waugh,[1] entitled "Radiology as an Adjunct in the Practice of Dentistry."

Dr. Waugh had sent to 325 outstanding dentists throughout the United States and Canada a series of questions which included the following:

Question 5 (*a*) Do you make a separate charge for each radiograph?

Yes, 87; no, 62.

(*b*) If so, does not the patient sometimes question the need of several in a given case?

Yes, 74; no, 34.

(*c*) If not in your own practice, do you believe this would be so in a great number of practices?

Yes, 116; no, 28.

(*d*) Would this not be overcome by hav-

1. Waugh, L. M.: D. Cosmos, 59:1105 (Nov.) 1917.

ing it understood that the necessary radiographs are a part of the service, and as such are not charged for separately but are included in the general fee?

Yes, 147; no, 8.

(*e*) Do you find the time saved by the radiodontic findings compensates for the time required in making them?

Yes, 162; no, 8.

The answer to these two final queries reflect an interesting attitude on the question under discussion; and when we appreciate that the questionnaire dates back to the almost archaic days of dental roentgenography, and surely the infancy of the system, how could the returns be less impressive if a vote were taken at this time?

In more than one third of the dental offices in our country, we will find some sort of x-ray apparatus; whereas, ten years ago, the appearance of one was a rarity. The profession has learned that roentgenology need not be a specialty, and that, while demanding intensive application when studied as seriously as the subject warrants and a profounder knowledge of many intricate phases of dental theory, physiology, pathology and etiology, as well as a technic akin to art, these very requirements are hardly more than every practitioner is supposed to possess to perform the usual functions that the profession imposes. Capable dentists are counted on to locate and diagnose pathologic conditions of the teeth, the mouth and the investing tissues, and it cannot be less than disconcerting to patient or dentist when, for a mere roentgenographic examination, reference must be made to some other dentist. The poignancy of this observation appears when we note how advertising quacks and imposters publicize this service, while otherwise capable and ethical dentists admit unpreparedness in so abundant a field of endeavor.

But, you assert, no criticism is leveled against the physician who refers a patient to a specialist. May it be ventured that the almost antipodean difference in the present day scope and responsibilities of the neighboring but distinctly separate professions is the answer to the assertion. In analyzing the respective relations to the particular profession served, it is not easy to compare the pediatrician, the neurologist, the psychiatrist or the ophthalmologist to the roentgenologist. This passes by the thought of many physicians that the general practitioner has permitted himself to be erased from the medical picture; but knowledge of the terrific course of study and the experience the medical man must undergo to gain recognition as a specialist of highest repute, of the concentration he is required to give his specialty, of the never ending rounds of clinics he must attend, cannot be disregarded. The degree of knowledge upon which the roentgenologist bases his right to be admitted a specialist is hardly in excess of what every dentist is expected to possess. Surely the study incident to learning the application of that knowledge to the making of and interpreting of the roentgenograms lies within easy grasp. The capable dentist should not allow himself to be forced entirely into the background by the specialist, becoming a mere satellite of the specialist as, in medicine, there seems a trend; for his field will not excuse it, and his patients will not permit it.

Remember that sporadic experiments after a desultory course of reading, coupled, perhaps, with some superficial but high powered instruction from equipment salesmen, will not constitute one a roentgenologist; and it is pathetically true that too many dentists assume qualification on such immature and pretended preparation. The poorly trained operators, advertising charlatans and commercial x-ray laboratories must be driven to

cover, and will be when the better equipped, ethical dentists enter the field in mass.

This will come to pass when we reach the ideal adjustment, whereby each clinician is his own roentgenologist. To arrive at this goal, many may find it expedient to return to their books, to attend numerous clinics, perhaps to seek close personal instruction from the experienced teachers of our acclaimed schools. But brushing up on pathology, physiology, etiology and the modern concepts of prophylaxis may not prove a poor policy even to the well informed.

No thoughtlessly made or intended derogatory observation is this, but unvarnished truth; for an appalling deficiency in the fundamentals of dental knowledge is too often exhibited by many with years of practice that should have been improved by continued reading. Were you to spend a few days with some active roentgenologist and hear the practitioners who come to consult him, hear their interpretations of roentgenograms and of related symptoms, hear their nervously ventured diagnosis or suggested treatment, you would find many as wofully lacking and as wofully wrong as were the physician and the dentist to whom I have alluded.

The alert, progressive clinician is ever searching for newer, better methods. Note the caliber of men attending the important conventions, count the outstanding dentists listening intently to valuable discussions, see the ablest of the profession observing closely the table clinics, intent on learning anything that is an improvement in theory or technic; for dentistry is certainly a progressive science, always ready to discard old ideas and substitute the tested newer thought; and it is quite easy to believe that five years hence will see those considered lacking who cannot interpret roentgenograms and operate the apparatus producing them.

That this shortcoming will not continue is written on the ever changing sands of science. In the very near future, no applicant incapable of qualifying as a roentgenologist will be licensed to practice dentistry. In Pennsylvania, the state board of dental examiners requires students to make a complete roentgenographic examination of a patient and write a full report of the roentgenographic findings; and the result of that test counts no little for or against the applicant. Pennsylvania recognizes roentgenology as an outstanding factor in the routine practice of the profession, and the theory that none lacking ability and experience to perform this routine function should be permitted to practice dentistry is so well founded that other states will follow this standard, and shortly.

Just as half-truths are often more dangerous than whole lies because more difficult to confute, in dentistry part or half treatments may be more dangerous than none at all; for they may cover up and hide for too long a period insidious infections that might have otherwise demonstrated their existence earlier. The study of dentistry embraces as imperative the search for causes, the diagnosis and prognosis of suspicious areas. The safe practice is to consider all areas suspicious until proved otherwise; and for this theory, the clinician as his own roentgenologist is the ideal arrangement. With the thought that competition usually results in the survival of the fittest, and recalling the philosophy that self-preservation is the first law of nature, the older practitioners may well contemplate that the oncoming dentist will be better prepared to meet the present need of the profession in the health preservation program of the nation in that he will be his own roentgenologist.

4001 Spruce Street.

ROENTGENOGRAPHIC STUDIES OF PERIODONTAL DISEASE*

By HENRY CLINE FIXOTT, D.M.D., F.A.C.D., Portland, Ore.

ON the use of the roentgen rays in the diagnosis of periodontal disease depends to a large degree the success or failure of the treatment of this condition. A thorough study of the roentgenographic appearance of normal alveolodental tissues is necessary if one is to recognize the abnormal. In this study, one must realize that the normal tissues surrounding the teeth in children, adults and the aged present distinct differences due to changes in tissue density.

I would recommend a careful study of these varying conditions; but, in this presentation, I shall call to the attention roentgenographic studies of tissue changes from normal to pathologic in the adult only. The roentgenographic appearance of normal alveolodental tissue about the lower anterior teeth is fairly well illustrated in Figure 1.

The alveolar process, coming to a slightly rounded point just below the cemento-enamel junction, has a definite irregular, cancellated appearance. The lamina dura, lining the root socket, is a thin radiopaque bony structure, appearing as an even white line surrounding the tooth root. Between the lamina dura and the cementum of the tooth, we find an almost radioparent even black line, the peridental membrane.

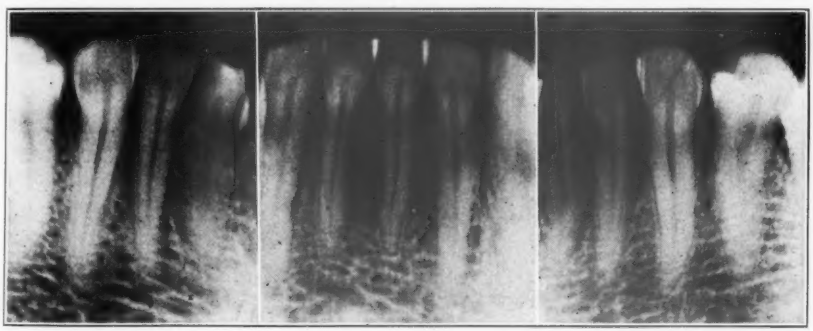


Fig. 1.—Roentgenographic appearance of normal alveolodental tissue about lower anterior teeth.

In examining roentgenograms for evidence of periodontal disturbance, it is with these tissues that we have to deal. Any change in the uniform density of the

*Read at the Seventy-Fifth Annual Session of the American Dental Association in conjunction with the Chicago Centennial Dental Congress, Aug. 11, 1933.

alveolar process, in the smooth even dense appearance of the lamina dura or the definite outline and radioparent appearance of the peridental membrane is an indication of tissue change with pathologic significance.

The first manifestation of periodontal disease is gingivitis. This condition is usually easily diagnosed by visual examination of the gingivae. A characteristic redness, slight swelling and tendency to bleeding, unaccompanied by pocket formation and pain, are observed. There being no change in tissue density, gingivitis cannot be demonstrated in a roentgenogram. Deposits of calculus about the necks of teeth that may be causing the irritation are readily seen.

Fig. 2.—Beginning of tissue change due to gingival irritation: recession of process and thickening peridental membrane, etc.

Merritt[1] describes the clinical symptoms of periodontoclasia as "inflammatory reactions in the gingivae and pericementum, absorption of the alveolar process, gingival recession, pocket formation, suppuration, tooth mobility, etc." He states that "no case can be diagnosed as periodontoclasia in which to some extent, at least, impaired circulation, infection, alveolar absorption, and pocket formation is not present."

Some of the causes of gingival irritation and tissue recession are the presence of food débris and serumnal and salivary calculus, malocclusion and trauma. This condition is easily controlled in its incipiency by removal of the irritation, correction of occlusion, etc., and treatment of any systemic disturbance that may be present.

If the irritation is prolonged or increased, the periodontal tissues recede. The alveolar process is involved and is destroyed, from the gingival margin toward the apex of the tooth roots.

Fig. 3.—Advanced alveolar absorption (horizontal) and heavy deposits of calculus.

In a roentgenographic survey, I found some form of periodontal disturbance in more than 80 per cent of 1,000 patients, 36.5 per cent of all teeth showing evidence of pocket formation from the beginning to the coronal third of the root and 13.4 per cent of all teeth having deep pockets extending beyond the coronal third of the roots.

Figures 2-7 illustrate progressive changes in tissue structure due to periodontal disease.

Figure 2 shows beginning tissue change due to gingival irritation. The

1. Merritt, A. H.: Periodontal Diseases, New York: The Macmillan Company, 1930, p. 65.

crest of the interstitial process is flattened and there is a definite thickening of the peridental membrane evidenced by the v-shaped radiolucent areas distad from the cuspid and first bicuspid and mesiad from the first molar.

Figure 3 shows advanced horizontal alveolar absorption. The alveolar absorption has extended to the apical third of the roots and there are heavy deposits of serumnal calculus present. The overexposure or overdevelopment of this roentgenogram would destroy some of the detail of the alveolar process between the teeth and tend to show the pockets even

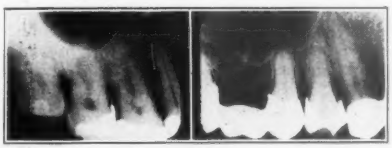


Fig. 4.—Alveolar absorption due to overhanging rough fillings, etc.

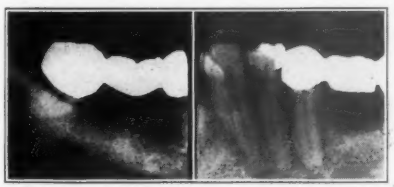


Fig. 5.—Roentgenographic appearance of oversize crowns and resulting tissue change.

deeper than they actually are. Thus, unless care is taken in our roentgenographic technic, we may be led to believe erroneously that considerable regeneration of process has taken place in a given area over a period of months. Periodical roentgenographic check-ups should have the same technical characteristics to be of real value.

Figure 4 shows gingival irritation due to the presence of rough and overhanging fillings, a primary cause of gingival irritation and resultant periodontal disease. The crest of the alveolar process recedes as absorption progresses and the peridental membrane is thickened below the point of irritation. The loss of contact due to caries on the distal aspect of the second molar has provided opportunity for food impaction between the second and third molars and resulting pocket.

Figure 5 shows overhanging margins of crowns. These form a most desirable

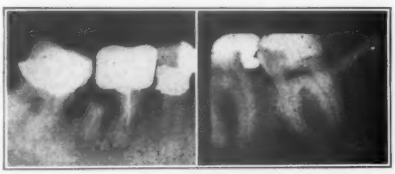


Fig. 6.—Caries accompanied by alveolar absorption.

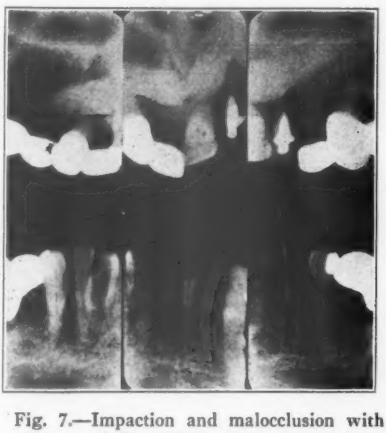


Fig. 7.—Impaction and malocclusion with resulting periodontal irritation and recession.

site for food débris, trauma, etc., starting the vicious circle of irritation, inflammation, infection, etc. The bicuspid crown filling the interstitial space makes an improper contact with the distal surface of the first bicuspid. Pocket formation and beginning of caries are evident at the gingival margin of the filling in the first

bicuspid. No explanation is needed of the potential danger offered by the molar crown.

Figure 6 shows caries. When this condition has progressed till there is a considerable amount of tooth structure lost, a storage place is formed for food débris, with resulting fermentation and infection. Contact is destroyed and the sharp edges of enamel and dentin act as an irritant, causing inflammation and recession.

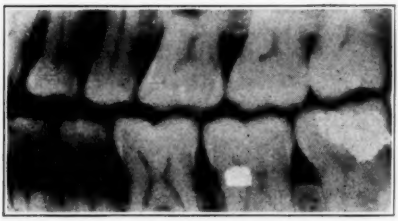


Fig. 8.—Roentgenographic study of horizontal type alveolar absorption. There is absence of caries, with excellent contact and occlusion.

Figure 7 shows traumatic occlusion and impactions, with resulting vertical destruction of the alveolar process and pocket formation.

Hermann Prinz[2] calls attention to the fact that recent investigations by many authorities has demonstrated two types of parodontitis: the horizontal and the vertical. He states that approximately 90 per cent of clinically observed cases belong to the horizontal type.

My observation leads me to conclude that while most of the areas of absorption in a given case are of the horizontal type, in most cases showing advanced periodontal destruction both the horizontal and the vertical types are found, the particular type being the result of a distinct class of irritation or interference. A greater number of teeth will be found showing investing tissue destruction following the root of the tooth downward; i.e., vertical absorption where there is malocclusion and irritation from fillings, crowns, etc.; and more of the horizontal type will be found when the teeth are sound and occlusion good.

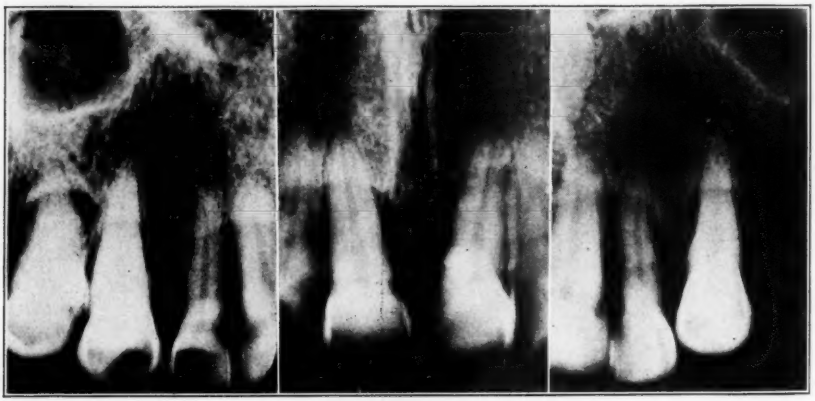


Fig. 9.—Roentgenographic study of alveolar absorption (vertical), showing lack of contact, etc.

Figure 8 shows the horizontal type of tissue absorption. The teeth are sound

2. Prinz, Hermann: Diseases of Soft Structures of Teeth and Their Treatment, Philadelphia: Lea and Febiger, 1928, pp. 397-407.

and well formed, and there is normal contact, with excellent occlusion and no apparent caries and definite absorption of the process about the roots of the teeth in a line parallel to the occlusal surface.

Figure 9 shows vertical type absorption. The destruction of tissue follows the roots of the teeth downward and parallel to the long axis and is usually found on either the mesial or the distal surfaces, corresponding to the point of irritation and/or direction of pressure.

Premature loss of teeth causes traumatic occlusion of the remaining teeth. The constant pounding loosens the teeth and we have a continuous sequence of trauma, irritation, inflammation, absorption, infection, etc.

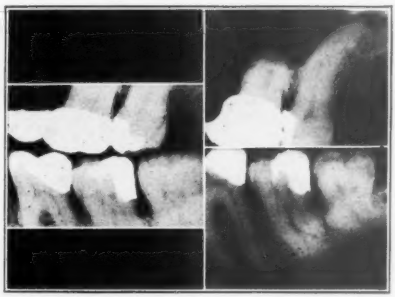


Fig. 10.—Films showing value of combining ordinary and bite-wing technic. There is a seemingly smooth mesial margin of the filling in the bite-wing film (left) and an actual rough overhanging filling margin in the ordinary film (right). Also the detail of alveolar destruction is better in the ordinary than in the bite-wing film.

In making a roentgenographic study of periodontal disease, it is well for us to consider the value of the different types of films used. When using ordinary dental films, regular emulsion, we get, as a rule, much better definition of tissues than when using fast or extra fast films, because there is less danger of overexposure and consequent loss of detail; also, a longer exposure brings out more of the details of the deeper structures, and proper development registers these details on our negative.

We should always endeavor to obtain as thorough a knowledge of conditions as possible when we undertake the treatment of a case. Anything less than that is not fair to the patient or to ourselves.

In making a roentgenographic study of the teeth to determine periodontal conditions, etc., I always use a combination of ordinary and bite-wing films. The type of pocket and other conditions are much better shown when both are used than is possible by the use of either separately. This fact is illustrated in Figures 10 and 11, bite-wing negatives of the same area.

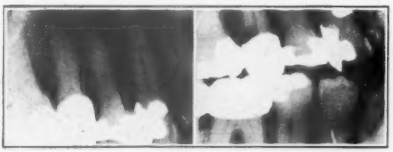


Fig. 11.—Combination of ordinary and bite-wing negatives. Caries under the second bicuspid crown and alveolar absorption are shown better in the bite-wing than in the ordinary film.

Figure 10, an ordinary negative, shows the rough overhanging filling in a molar and the depth of pockets about roots of teeth better than they could be shown in the bite-wing.

In Figure 11, a bite-wing film, the caries under the crown and the amount of tissue absorption (pockets) are more clearly demonstrated than in the ordinary negative.

Figure 12, which shows a periosteal abscess and absorption of the process in the bifurcation of the roots of teeth, is characterized by the radiolucent appear-

ance in the region affected. Often this type of periodontal infection is most difficult to distinguish in a roentgenogram and also is least amenable to treatment.

Figure 13 shows the retromolar space. The tissues surrounding the third molar offer a fertile field for infection. Complete information regarding the retromolar space, whether the tooth is fully erupted or impacted, is essential to the proper treatment of periodontal infection.

One who is not thoroughly experienced in roentgenographic interpretation may get a better understanding of conditions and a more striking illustration of tissue changes by a study of both the negative and the positive, or print. (Figs. 14-15.) Added emphasis is given to tissue detail in the positive, or print. It must be remembered that black in the original film or negative is shown as white in the positive or print, etc.

Fig. 12.—Destruction of alveolar process in root bifurcation and periosteal abscess. *1*, upper first molar; *2*, lower first molar.

Stereoroentgenography adds depth to the roentgenogram. It is of definite value in studying cysts and locating foreign bodies, pieces of roots, etc., and in roentgenographic studies of the maxillary and accessory sinuses.

Stereoroentgenography requires an exact technic, and its general use in dentistry is limited because of a lack of experience on the part of the general practitioner who endeavors to do his own roentgenographic work.

In the treatment of periodontal disease, thoroughness in examination and diagnosis is essential, and no examination is complete when this most efficient aid to diagnosis, the roentgen rays, is not intelligently used.

Neglect to recognize the roentgen rays as prerequisite to proper treatment and failure to employ them can be attributed to but two things: lack of understanding of their value as an aid in diagnosis or lack of interest in our work. There can be no excuse for either.

The value of the roentgen rays in the treatment of periodontal disease depends on: (1) a knowledge as to what information can be secured in a roentgenographic study of periodontal tissue; (2) the technical skill that enables one to secure readable roentgenograms, and (3) the ability to interpret the roentgenograms when secured.

Fig. 13.—Roentgenographic study of retromolar pocket and impaction.

INFORMATION THAT CAN BE SECURED IN A ROENTGENOGRAPHIC STUDY OF PERIODONTAL TISSUES

A thorough roentgenographic study of the oral structures should show the following as factors in periodontal disease:

(*a*) Deposits of calculus about the

necks of teeth and on the root surface below the gingival margins.

(*b*) Overhanging rough fillings that irritate the tissues and cause inflammation, etc.

(*c*) Oversize crowns impinging on the soft tissues, retaining food débris and forming a breeding place for bacteria.

(*d*) Caries, which besides being a direct source of tooth degeneration and systemic infection, assists in forming pockets about the roots of teeth by the breaking down of contact points, with resulting malocclusion, trauma, etc.

(*e*) Impacted unerupted teeth and missing teeth. Traumatic occlusion results in the presence of impactions and when teeth are missing.

(*f*) Foreign bodies lodged in the tissues or between the teeth.

(*g*) Malocclusion due to lack of development of the jaws, injury, etc.

The roentgenograms will also show the results of the foregoing conditions in a thickened peridental membrane and the beginning of alveolar absorption, depth of pockets about roots of teeth and involvement of tissues in the bifurcation of roots.

Fig. 14.—Ordinary negative enlarged for comparison with enlarged print of same area in Figure 15. Additional emphasis on tissue detail will be noted when both are studied.

TECHNICAL SKILL

Technical skill in obtaining readable roentgenograms is absolutely essential to success. Few dentists in general practice possess this skill, and yet many attempt to make diagnoses and perform operations on information that is inadequate and often misleading. Many failures in treatment are the direct result of acting on such information. I cannot emphasize too much that to use the roentgen rays successfully in diagnosis, one must take the time to acquire sufficient skill in the use of the x-ray machine to master the technic of posing patient for exposure and of placing and holding films in proper position so that distortion of the image is reduced to the minimum, and must also know how to care for the exposed film in the developing room so that otherwise good negatives are not ruined by stains, scratches, underdevelopment, overdevelopment, etc.

Fig. 15.—Print, or positive, of Figure 14.

Simpson[3] describes the technical requisites of roentgenograms most interestingly:

> The technical requirements of radiographic negatives are: (1) Covering the field of examination to the best advantage. (2) Showing no evidence of mobility during exposure. (3)

3. Simpson, C. O.: Technic of Oral Radiography, St. Louis: C. V. Mosby Co., 1928, p. 33.

Showing a diagnostic view of the region with the minimum distortion of the image. (4) Showing the maximum definition and contrast consistent with penetration of the structures. (5) Freedom from stains and abrasions. (6) Presenting a symmetrical projection of the image of the film.

It is fully as essential to acquire skill in roentgenographic technic as skill in impression making, etc., for dentures, crowns, bridges, etc. If one does not wish to give to this important phase of dental practice the time and energy necessary to master the details of procedure, he should not have an x-ray machine in his office, but should send his patients to a dentist specializing in such work if available or to a qualified medical roentgenologist. There are no detours.

ABILITY TO INTERPRET ROENTGENOGRAPHIC NEGATIVES

I have shown that lack of skill in the use of apparatus, etc., tends to produce poor roentgenograms and thereby minimize their value in diagnosis.

Pollia says, regarding interpretation[4]:

It is universally conceded that to make an interpretation, it is necessary to have a moderate conception of the anatomical structures which form the teeth and jaws and how they are altered when affected by disease. . . . Since a fine clinical type of radiograph can be rendered useless by lack of skill and care in the examination and reading of it, it is essential that these operations should be just as accurate and painstaking as the radiographic procedures.

The value of the technically perfect roengenogram then is determined directly by the ability of the individual to interpret the lights and shadows shown and to classify them as normal or pathologic. Let us all strive to acquire that knowledge and ability that we may be better qualified to render the reasonable degree of efficient service which our patients have a right to expect.

729 Medical-Dental Building.

4. Pollia, J. A.: Fundamental Principles of Alveolo-Dental Radiography, New York: Dental Items of Interest Publishing Company, 1930, p. 162.

A CENTURY OF PROGRESS IN HUMAN NUTRITION IN RELATION TO DENTAL HYGIENE, AND THE EFFECT OF DIET ON THE TEETH

By J. SIM WALLACE, M.D., D.Sc., L.D.S., F.A.C.D., London, England

ALTHOUGH it is more than a century since the idea became prevalent that sugar was harmful to the teeth, it is only during the last one hundred years we have come to realize that the extraordinary prevalence of the diseases of the teeth in civilized communities is almost entirely due to certain errors in the diet, which have spread wheresoever civilized methods of refining and preparing food have come into vogue. Even up to the end of last century beliefs in hereditary degeneracy, climatic influences, the use of soft drinking water, forced education, unduly stimulating the brains of children, and other absurd theories were seriously put forward to explain the almost wholesale destruction of the teeth. It must be admitted that a few of the more prescient in the dental profession recognized the important part that diet plays and how it affects the teeth. Thus,

rather over a century ago, L. S. Parmly said:

Caries, or the decay of part of the teeth, arising from uncleanliness of the mouth, is the most frequent disease to which they are liable. It commences generally, in the interstices and irregularities of the teeth, in the form of a small dark spot on the enamel, which, eating it away, passes inward, and occasions a still more rapid decay of the bone, till the tooth is entirely destroyed. It has been a grand mistake with authors on this subject, that caries commences internally, and acts on the bony substance of a tooth. The enamel, however, may be considered, at all times, the first seat of attack, though on the bone [dentin], from its softer texture, it makes a greater and quicker havoc than on the outer crystalized covering, which, to the eye, appears oftentimes scarcely perforated.[1]

Parmly was fortunate in that, as he states, the calamities of war afforded him "an opportunity with which few, perhaps, of his profession have been favored, of investigating the true cause of caries, and of satisfying himself in regard to the accuracy of his own theory." He tells us that he has "now in his possession thousands of teeth extracted from bodies of all ages that have fallen in battle, inflicted with caries from its first commencement to the last stage of the disease, and he will undertake to satisfy the most skeptical on this point, that caries universally commences externally."[2] In 1835, another practicing dentist, William Robertson, published a book[3] in which he explained the origin and nature of decay in teeth. He followed the same lines as Parmly, and elaborated the theory. He claimed that corrosive material is formed from the food particles which were liable to lodge in certain situations, and so brought about the localized destruction of the tooth. The prevalence of caries he attributed to the preparation of food, which rendered it more liable to be retained about the crevices of the teeth. Neither Parmly nor Robertson seems to have taken any special interest in the normal physiologic self-cleansing processes in the mouth, nor did they suggest the necessity of any dietetic reform. The rôle of bacteria in the production of acid from carbohydrates and the particular kinds of foods (carbohydrate) that favored the proliferation of acid-forming micro-organisms was not known at this time, but, during the latter part of last century more especially, as the result of the work of Pasteur, Magitot, Miller and others, it became universally recognized that dental caries is a chemicoparasitic process, that primarily the acid formed on or near the surface of the enamel decalcified it and that thereafter the micro-organisms invade the enamel and dentin, destroying the tooth structure as they go.

Though Miller showed conclusively that caries was a chemicoparasitic process and that the active agents were bacteria, his theory, as far as he carried it, failed to explain the prevalence of caries in individual teeth in the same mouth, as unfortunately the philosophic work of the earlier investigators was overlooked. The attempt was made to explain matters by asserting that there were points of least resistance,[4] but diligent search revealed the fact that defective structure appeared to be about as common in animals and primitive man who were caries free, as

1. Parmly, L. S.: Practical Guide to Management of Teeth, Comprising Discovery of Origin of Caries, or Decay of Teeth, with Prevention and Cure, 1818, p. 77.

2. Footnote 1, p. 86.

3. Robertson, W.: Diseases of Teeth, in which Origin and Nature of Decay are Explained, and Means of Prevention Pointed Out, 1835.

4. Miller, W. D.: Micro-Organisms of Human Mouth, Philadelphia: S. S. White Dental Mfg. Co., 1890, p. 147.

among those whose teeth were supposed to be specially liable to the disease. Faulty nutrition and building of teeth were also said to explain the supposed susceptibility to caries of the civilized, but this was negatived by the fact that the first permanent molar tooth is more than twenty times more liable to become carious than are the lower incisors. These teeth are formed about the same time. If faulty nutrition during the formation of the teeth was said to be the cause of defective structure, which gave rise to susceptibility to caries, teeth formed about the same time should be about equally susceptible to the disease. Precisely the opposite is true, when we compare the lower incisor teeth with the first permanent molars or with the upper incisors. It was not until 1900,[5] and the opening years of the present century, that the true explanation of the prevalence of caries was advanced. The explanation was on the lines laid down by Parmly and Robertson, together with a recognition of the chemicoparasitic process which has been established by Miller,[6] and an appreciation of the all important part that rapidly fermentable carbohydrates played[7]; though this was not all. Acid fermentation could and did take place in the mouth from the presence of certain carbohydrate foods, without necessarily causing decalcification of the enamel. Only when the acid could accumulate and not be washed away or neutralized by the saliva could the destruction of the enamel take place. The chief ingredient in the dietary of the civilized which prevents the washing away of acid and impedes its neutralization by the saliva is sugar, when not eaten with substances of a detergent nature; and for the following reasons: Concentrated sugars are viscid, and thus tend to lodge unduly in certain areas about and between the teeth. They are themselves subject not only to acid fermentation, but they, or at least some of them, also undergo a gummy fermentation, and thus interfere with the permeability of the mass. From these and other considerations, the cause of caries is now recognized and can be defined as "the undue lodgment of plaques or masses of acid-forming micro-organisms together with fermentable carbohydrates when the acid formed is protected from the action of the saliva by the impermeability of the mass."[8]

When the cause of caries became fully known, it was a relatively easy matter to show how the disease might be prevented. Although they amount to much the same thing, there are two methods of preventing caries by following proper dietetic methods. The first restricts the amount of fermentable carbohydrates, which tend to lodge and give rise to the proliferation of acid-forming bacteria and the accumulation of acid in contact with the enamel; which amounts to saying that sugar, especially combined with other fermentable carbohydrates, should be more or less sparingly used, or taken only well diluted with water and substances such as acid and fibrillar cellulose, as in fruits and vegetables which stimulate mastication and the glands concerned in oral hygiene (salivary and mucous).

The other method, though perhaps sometimes less economical, arranges the dietary in such a way that when concentrated sugary foods are eaten, detergent

5. Wallace, J. S.: Cause and Prevention of Decay in Teeth, Philadelphia: P. Blakiston's Son & Co., 1900.

6. Miller, W. D.: Micro-Organisms of Human Mouth, Philadelphia: S. S. White Mfg. Co., 1890.

7. Wallace, J. S.: Supplementary Essays on Cause and Prevention of Dental Caries, 1906.

8. Wallace, J. S.: Prevention of Dental Caries, Ed. 2, London: Office of Dental Record, 1912; p. 27. Dental Diseases in Relation to Public Health, London: Dental Record, Alston House, 1914, p. 34.

foods form part of the meal, preferably coming last, so that the caries-producing carbohydrates are removed from the mouth toward the end of the meal.

It was the dental profession which at the beginning of the present century really introduced the idea of accessory food factors, that is to say, qualities or substances in the food which, though of no nutritive or energy-giving value, were yet most important from the point of view of oral and alimentary hygiene[9] and, indirectly, nutrition. But the accessory food factors were not simply vitamins, though these may stimulate the glands concerned in oral hygiene, just as they are recognized to stimulate the glands and processes which help to maintain the alimentary canal in a hygienic state, and so permit the healthy absorption of nutriment, salts, etc.[10] The chief accessory food qualities for the maintenance of oral and dental hygiene are: (1) the physical consistency of food, which stimulates the mechanical self-cleansing processes; (2) organic acids generally found in fruits and vegetables, which stimulate the flow of alkaline saliva; (3) aromatic and stimulating soluble substances having a similar effect. To reduce all this to simplicity, foodstuffs have been classified as of two types. One consists of those that are not cleansing and so are liable to induce dental caries. These are now recognized to be: farinaceous and sugary food in general without fibrous element; for example, sweet biscuits and cake; bread and marmalade; bread and jam; new bread without crust; bread soaked in milk; milk puddings; porridge with sugar or syrup; preserved fruit; chocolate and sweets of all kinds; honey; liquids such as cocoa and chocolate. Such foods should not be eaten except with or where they are to be followed by foods of the cleansing kind.

2. On the other hand, we have those foods which are cleansing and preventive of dental caries; that is to say, fibrous foods generally, for example, fish, meat, bacon, poultry, uncooked vegetables, lettuce, cress, radishes and celery (cooked vegetables are, as a rule, cleansing, but in a less degree than uncooked vegetables); stale bread with crust, toasted bread of all kinds, twice baked bread, pulled bread and cheese; fresh fruits, especially those requiring mastication, e.g., apples; savouries. Several foods though not fibrous are also cleansing and help to prevent caries; for example, fatty foods, e.g., butter and margarine; liquids, tea (preferably Russian fashion), coffee, butter milk, water, soups and beef tea. Other foods, though not detergent, may be antagonistic to the inception of caries by favoring the proteolytic instead of the saccharolytic bacteria; e.g., cheese, eggs. Notwithstanding much opposition, the principles upon which the newer knowledge is based have gradually gained acceptance in all parts of the world.[11] For more than twenty years, they have been embodied in our most important textbooks.[12] They also, to a considerable extent, have been introduced into various authoritative and widely read books, more especially those devoted to the rear-

9. Wallace, J. S.: Rôle of Modern Dietetics in the Causation of Disease, London: Bailliere, Tindall & Cox, 1905.

10. Cramer, W., and Kingsbury, A. N.: Local and General Defences Against Infections and Effect of Them on Vitamin Deficiency, Brit. J. Exper. Path., 5:300 (Oct.) 1924.

11. Shaw, J. C. M.: Dental Problem: Prevention of Dental Disease, South African M. J., 6:147 (March 12) 1932. Brownlie, J. D.: Retrospect on Changes in Thought and Methods, D. Rec., 52:258 (May) 1932.

12. Colyer, J. F.: Ed. 3, 1910. Colyer, J. F., and Sprawson, Evelyn: Dental Surgery and Pathology, Ed. 6, New York: Longmans, Green and Co., 1931. Bennett, N. G.: Science and Practice of Dental Surgery, Ed. 1, New York: Wm. Wood and Co., 1914, Ed. 2, 1931.

ing of children.[13] To indicate what has been and is being done to disseminate the newer knowledge to the people in simple language, the rules drawn up by the Society of Medical Officers of Health (and now adopted by the Dental Board of Victoria, the People's League of Health, etc.) may be quoted:

1. As soon as an infant needs food other than milk (8 to 9 months), give it in a solid form, such as crusty bread, twice baked bread, or crisp toast, thus compelling mastication. Do not give bread soaked in milk or milk thickened with flour or other starchy foods, such as most patent foods. Encourage the child to chew and see that it breathes through its nose. In these ways, good habits of mastication will be formed.

2. As the child grows up, you should still give most of the food in a solid form, compelling mastication. Food, other than milk, should rarely be taken in a liquid form. Vegetables and meat should not be minced and soaked in gravy. Bread should not be eaten new, and it should have plenty of good firm crust.

3. After the first two or three years of life, the child should have three meals a day and no food between.

4. It is not advisable to drink at meal times, but plenty of water should be taken between meals. Milk is a food, and should only be taken at meal times, and must be followed by a tooth cleansing food.

5. All meals should be finished with a cleansing food.

6. Sweets, chocolates and biscuits are very harmful to the teeth, if taken the last thing at night. They should only be taken at meal times, and should be followed by a cleansing food. The custom of giving milk and biscuits the last thing at night should not be allowed.

7. Correct feeding and chewing are the best means of preventing decay of the teeth, though the intelligent use of the toothbrush will be found helpful.

13. Thomas, J., and Findlay, L.: Clinical Study and Treatment of Sick Children, Ed. 5, 1933.

Prevention of other diseases associated with the teeth, as indeed, in all probability, of several diseases of alimentary origin, e.g., indigestion, gastric and duodenal ulcer, appendicitis, rickets and internal cancer,[9] can be made on similar lines. Here, it is only necessary to refer briefly to the other conditions associated with the teeth. Pyorrhea is largely the result of stagnation of alkaline secretions containing albuminous substances which stimulate the development of proteolytic bacteria, including pus-producing microorganisms. This results from food which does not demand sufficient mastication, and which is also not of a type promoting disintegration and removal of mucus from the necks of the teeth. Though conditions which lead to pyorrhea make the teeth look and actually become dirty, this does not tend to induce dental caries, as the proteolytic bacteria associated with the formation of tartar and pyorrhea do not form acid, and the dictum that "clean teeth never decay" is not invalidated because dirt of the nature indicated (i.e., of an alkaline nature) is antagonistic rather than otherwise to dental caries. The foods which are most effectual in preventing this stagnation of mucus and the serum which exudes at the sulcus round the necks of the teeth are fresh fruit and vegetables, though other foods stimulating mastication, such as beef, mutton, nuts, etc., are also valuable.

With regard to irregularities of the teeth, it may be said that, 100 years ago, we had practically no knowledge of the causes of such maldevelopment as led to their production. Now they are fully understood and the means of prevention fairly well recognized.[14] This, again, is largely dependent on food which demands ample mastication, for the development of

14. Wallace, J. S.: Variations in Form of Jaws with Special Reference to Etiology, (Cartwright Prize Essay, 1927).

the jaws is to a certain extent dependent on function. Here too, the consistency of the food is of considerable importance. In childhood, milk is a very useful food for promoting growth in general, and natural suckling is of great importance, but drinking cow's milk does not stimulate the muscles of mastication, and so it has been found that even healthy milk-fed children are very liable to have crowded and irregular teeth. Of course, when a sufficiency of food is given to stimulate the gnawing instinct and particularly the activity or function of the front teeth, together with, at a later stage, i.e., from about 12 months onward, the use of the molar teeth, milk may be taken without interference with the growth of the jaws or harm resulting to the teeth.

The last disease, or rather dystrophy, to which we may allude is dental hypoplasia. Though but little was known about this 100 years ago, we now recognize that it results from toxins which interfere with the proper functioning of the enamel-forming cells during the secretion of the enamel. Various diseases occurring during the formation of the crowns of the permanent incisors and first molars, may cause it. Syphilis is commonly said to cause hypoplasia of the upper central incisors. Measles, scarlet fever and other exanthematous diseases often account for the more common type of hypoplasia exhibiting horizontal grooving and pitting of the enamel on the incisors, cuspids and first molars. This type of hypoplasia may sometimes be caused by rickets, though, in a recent investigation, it was found that only in 22 per cent of rachitic children suffering severely enough to be in hospital were the teeth formed during this period hypoplastic.[15] In these cases, it may be surmised that there was some other intercurrent disease or that the rickets was of unusual severity. More might have been said about the etiology of other diseases of the teeth and less about hypoplasia had it not been for the fact that, in recent years, much discussion has raged as to whether hypoplasia and consequent defective structure of the teeth are of any particular consequence as a cause of the wide spread prevalence of caries. Certain it is that Hutchinson's teeth only rarely become carious. The lower incisor teeth, though hypoplastic, in about 10 per cent of individuals in England at least are about twenty times less frequently affected by caries than the second permanent molars, which are but rarely seen to be affected with hypoplasia. Some dentists even go as far as to say that hypoplastic teeth are particularly resistant to caries. Nevertheless, it is generally believed that anything which is conducive to local stagnation of fermentable carbohydrate does predispose to caries, and clinically it is noted that, in certain cases, when, for example, there are pits in the incisors and cuspids, decay starts when it otherwise would not be liable to do so. This view is also really supported in a negative way by the relatively rare occurrence of hypoplasia in Hutchinson's incisors; for, in this case, the crown is stunted and the interdental spaces are less liable, even than between normal teeth, to become impacted with food of a caries-producing nature. Recognizing that hypoplasia is occasionally a predisposing cause of caries, and further that it is a disfigurement in itself, we see the importance of prevention. Nature provides for this excellently in the case of the temporary teeth, less than 1 per cent of children being affected, and, as a rule, only to a trivial extent. In civilized communities, particularly in crowded areas, children are subject to certain diseases during the formation of the crowns of

15. Mackay, H. M. M., and Rose, S. F.: Vitamin D Deficiency, Dental Caries and Tonsillar Enlargement, Lancet, 2:1230 (Dec. 5) 1931.

the permanent incisor teeth. It is recognized that they should be prevented as far as possible. The prevention of such diseases depends on general hygiene rather than on diet. Even on a rachitogenetic diet, the avidity of the enamel-forming cells is so marked that though bone may fail to calcify properly, the enamel is not affected. Here, we see the wisdom of Nature, for defective calcification of bone, which undergoes constant metabolism, may be corrected later; whereas, the enamel prisms once formed, being wholly composed of inorganic matter, can never undergo such metabolic processes as would be required to change faulty into normal enamel. Nor can it be said that any of the multitudinous variations in diet, including variations in irradiated ergosterol, can in themselves be considered a cause of faulty formation of the enamel. This tissue appears to have the primary claim on such calcium as may be in the diet; and, with regard to vitamin D in the food, it is required only in infinitesimal amount, if at all, since light, especially sunlight, promotes its formation, and moreover there is a certain "power of storage." Thus, even in countries in which the days are short and there is but little sunlight in winter, the enamel is just as well formed, as it is in summer. Were it not so, the incisors, the crowns of which take four or five years to form would show a similar number of transverse bands of thick enamel well formed during the summer months, and thin ill-developed enamel formed during the winter months. But anything of this nature has *never* been observed. It is on the particular form of the individual teeth and their position in the dental arch that the position of the carbohydrate retention areas, which predispose to carbohydrate stasis, depends. Thus, the incidence of caries in individual teeth in the same mouth, e.g., the very great frequency of caries in the molars, and its general rarity in the lower incisors are fully explained on the local food stasis theory of causation, while this same well-known incidence is now regarded as an insuperable objection to any theory of deficiency in the foods from the nutritive point of view. The hereditary form and the position of teeth in the dental arch are wholly unalterable by variations in the nutritional quality of the diet, and predisposition to caries in the molar teeth will always remain. Fortunately, the diet can be of such nature, or so arranged, that the prolonged retention of fermentable carbohydrates in more or less immediate contact with the teeth, undisturbed by the access of the saliva, need not occur in any of the teeth; in other words, caries can be prevented.

The results obtained from the dietetic or, as it is sometimes called, the natural method of prevention have, during the last quarter of a century, been so excellent that apparently all that is now required is the dissemination of the knowledge which we already possess. Unfortunately, the great progress which has been made in the study of the effect of diet on the teeth in keeping them free from caries and pyorrhea is not at all generally known. Nor can we say that the influence of diet in promoting the growth of the jaws and the regular arrangement of the teeth is known except by a small number of experts who have devoted special attention to the subject. Nevertheless, with regard to our knowledge of causation, most remarkable progress has been made even though attempts in abundance have at least been initiated to uphold retrogressive theories which tend to obscure it.

In the foregoing brief outline of the progress that has been made, a few names have been mentioned, but the elucidation of the etiology and prophylaxis of dental

caries, pyorrhea and the irregularities of the teeth has been the work of many minds. To mention all is impossible here. It would be an unpardonable omission in this connection not to refer to the work of one of the most famous men known to the dental world, the late G. V. Black, not only because he was long a highly honored dentist and citizen of Chicago, but also because, as noted many years ago without thought of centenary celebrations, "his bacteriological, gnathodynamometric and chemical and physical investigations, are of quite exceptional importance in having provided data for the elucidation of the causation and prevention of dental caries."[16]

16. Footnote 8, first reference, p. 68.

A COMPARATIVE STUDY OF SLICE AND BOX PREPARATIONS*

By W. L. WYLIE, D.D.S., Cleveland, Ohio

COMPARISONS herein made must be predicated on agreement as to certain factors in the beginning of decay. It is well known that decay progresses from without inward, and it is generally conceded that a filling (or an inlay), if it is to resist with assured permanence the attacks of caries on the surface treated, even though mechanically perfect, must have its margins located in regions where experience has shown decay as a rule does not begin. Recognition of the existence of tooth areas some of which are susceptible and others immune to decay must form the basis on which to make any comparison of preparations designed for its treatment.

The treatment of natural defect, or Class I, cavities from the standpoint of outline form is simple. All such cavities lie occlusally or incisally from the height of convexity, in areas freely swept by the excursions of food in mastication. Nothing more is required than placing margins of fillings in such areas that a sharp explorer may be passed from tooth to filling or filling to tooth, at any point, without detecting where the two meet. There must be an entire absence of anything approaching a pit or defect which would afford a lodging place for food débris and consequent bacterial action.

The treatment of carious conditions occurring gingivally from the height of convexity is not so simple from the standpoint of outline form as for Class I cavities. The simple expedient of making smoothly finished margins, while as important as for Class I cavities, is not sufficient. Treatment must take into consideration conditions not existent in that type of cavity.

It is a matter of common knowledge among operators that the proximal surface of a tooth just gingivally from the contact point, and occlusally from the gum margin, and of variable buccolingual extent, may be subject to decay. This area lacks the beneficial sweeping effect afforded the tooth occlusally from the height of convexity and is likely to become a region of susceptibility whose

*Read at the Seventy-Fifth Annual Session of the American Dental Association in conjunction with the Chicago Centennial Dental Congress, Aug. 9, 1933.

limits mark the extent to which decay will progress on the surface of the tooth. Therefore, inclusion of the susceptible area within cavity margins is necessary if there is to be assurance against recurrence of decay about the filling to be placed. This precautionary measure of cutting away sound tooth structure for the sole purpose of preventing such recurrence has been termed extension for prevention. While acceptance of this principle has become almost universal, certain misconceptions have been associated with the term, notably with reference to depth of the preparation. Some have seemed to think that carrying out this principle necessitates a preparation of considerable depth, a belief contradicted by the statement of G. V. Black taken from "Operative Dentistry," Vol. 2:

> Extension for prevention does not mean deep cavities in any case. The whole intention is to prevent beginning decay in the surface of the enamel. It does not have any reference to caries of dentin whatever. The shallowest cavity that will give stability to a filling answers the requirement. . . . Under all circumstances in filling teeth, the object should be to make cavities only deep enough to give stability to the filling, except as deeper cavities are required by removal of the last trace of decayed material.

Another misconception which seems to prevail in the minds of some is that extension for prevention requires that every proximal preparation shall be carried to the angles of the tooth. When the two approximating surfaces are comparatively flat, such an assumption is correct, but much less cutting will suffice if the two surfaces meeting are more or less spherical. The objective sought is the inclusion of the susceptible area gingivally from the area of contact, the buccolingual length of which will vary with the nature of the two surfaces meeting.

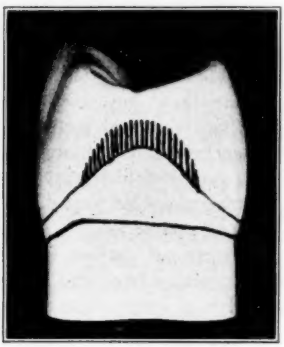


Fig. 1.—Area on mesial surface representing region of susceptibility.

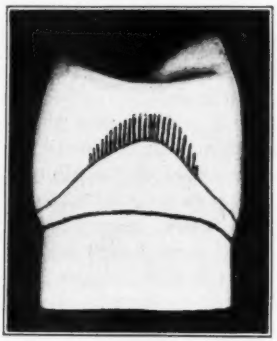


Fig. 2.—Area on distal surface representing region of susceptibility.

Practical observations through the years since the principle of extension for prevention was first promulgated attest the correctness of the practice. Even those who take exception to the cavity forms advocated by Dr. Black admit the necessity of carrying out this principle. H. W. Gillett and A. J. Irving, who claim numerous advantages for the slice preparation in their series of articles in the *Dental Items of Interest* on "Gold Inlays by the Indirect System," in discussing the direct inlay assert their belief in extension for prevention:

If the inlay is the least bit shy of filling the cavity, the operator may yield to the temptation to dress down the enamel to the same level, with abrasives, and so invite disaster in locations not kept clean by the natural friction of mouth function.

The only criticism of the theory of extension for prevention that has seemed to us worthy of consideration is the question concerning the results of this same leveling of surfaces by abrasives that was common in gold foil practice regardless of whether they were gold or enamel.

We can conceive of the possibility that the cutting of approximal enamel surfaces with strips and paper discs, as was constantly done in finishing foil fillings, may have been a factor in the recurrence of

Fig. 3.—Templet in position on mesial surface for purpose of locating buccal and lingual terminations of susceptible areas.

decay in those areas. We shall never know whether this is a point of importance unless, by some turn of the wheel not now possible to forecast, we find ourselves able to prepare inlay cavities in caries susceptible mouths without inclusion of extension for prevention and insert in them inlays that require no finishing after insertion and, therefore, no marring of adjacent enamel surfaces.

. . . Experience with amalgam where practice approaching this is sometimes practicable does not lead us to expect any evidence tending to discredit the soundness of Black's reasoning, or the reasoning of those who preceded him in the statement of the principle of which Black's masterly handling made the profession effectively conscious.

Dr. Black advocated cavity preparations more or less of box form, and all such preparations described by him were for gold foil. It is inconceivable that he would not have granted the need for modifying preparations to suit the characteristics of the material to be used, yet it is remarkable how slight those modifications need be to meet the requirements of any material that has yet been made available.

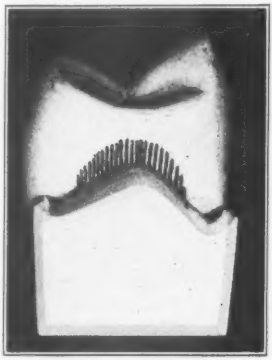


Fig. 4.—Templet in position on distal surface for purpose of locating buccal and lingual terminations of susceptible areas.

The Class II preparation as described for gold foil has, in the proximal portion, its buccal and lingual walls lying each in two planes, one consisting entirely of dentin and the other of enamel. The two opposite dentin walls are made parallel in order that maximum retentive advantage may be taken of this elastic structure in placing the gold. The enamel walls, on the other hand, flare outward into the embrasures to bring the buccal and lingual margins into nonsusceptible areas. The placing of convenience points in the

axiobuccogingival and axiolinguogingival angles for ease of starting the foil, and extension of the cavity to the occlusal surface in dovetail form, so made as to serve the double purpose of including the natural defects and at the same time furnishing retention form, constitutes the conventional Class II preparation, with which we are all familiar. All cavosurface angles are beveled, not only to assure the absence of loose enamel rods but also to eliminate sharp angles which may be subject to fracture while the foil is being placed.

A cavity differing only in minor details from the cavity briefly described for gold foil will meet well the requirements for a cast gold inlay. The use of hard casting golds of great strength eliminate the need for great bulk in the inlay; hence, cavities with less depth will meet requirements relative to strength of the restoration. Parallel dentin walls in the proximal portion serve no valuable purpose, since no advantage can be taken of the elastic dentin, and experience has shown that sufficient retention is provided in a preparation having correct occlusal outline and with buccal and lingual walls on the proximal aspect flaring outward into the embrasures in single planes. Convenience points, like any other type of undercut, have no place in an inlay preparation. Cavity walls lying in line with the long axis should diverge slightly as they approach the occlusal surface. Cavosurface angles on the occlusal and gingival aspect only should be beveled, the bevel at the gingival being somewhat more pronounced than for gold foil.

The frequence with which degenerating or dead pulps have been found under large fillings or inlays, together with conclusive proof that infection arising therefrom may bear an important causative relation to remote pathologic conditions, has prompted the feeling that more conservative measures in cavity preparation should be adopted. From this feeling came a preparation embodying the principles already referred to but differing in several respects from the box form described by Dr. Black. This has come to be known as the slice preparation.

The slice preparation differs essentially from the box type in the method used for placing margins of the proximal surface in areas immune to decay. This is ac-

Fig. 5.—Templet in position for locating susceptible areas on mesial surface of tooth on which one of the cavities is to be prepared.

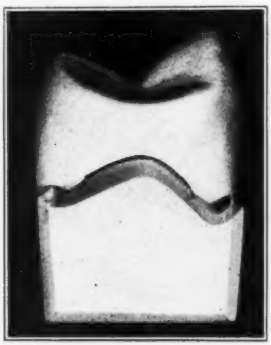


Fig. 6.—Templet in position for locating susceptible areas on distal surfaces of tooth on which one of the cavities is to be prepared.

complished by means of a disk, either straight or saucer shaped, with which the necessary amount of the proximal portion of the tooth is cut, or sliced, away. If it is assumed that this cut would remove all decay, this constitutes the proximal portion of the preparation except that form designed for retention, which varies.

Opinions differ as to whether the gingival portion should terminate in a slice cut, or a narrow ledge or wall should be left by keeping the disk entirely within the tooth in this region. J. J. Travis expresses a preference for the latter, while Dr. Gillett feels that full advantage is not gained unless the preparation terminates in a slice.

Retention form in the proximal portion of the preparation as advocated by Dr. Travis consists of a groove in the axial wall midway between the buccal and lingual margins and extending from the pulpal wall to the gingival. Dr. Gillett seems to prefer a rectangular box type of retention placed similarly to that of Travis. Others favor a dovetail channel type of retention, which should be most effective for this purpose.

In making the initial slice cut, Dr. Gillett recommends, particularly where there is a small amount of decay, the saucer-shaped disk in preference to the straight type. He cites two advantages for this technic: 1. The buccal and lingual wings of the restoration are thus made thicker and stronger. 2. Less gold will be shown on the proximal.

The occlusal portion of the slice preparation differs little from that of the box type. Natural defects are followed to their termination and retentive form is gained in this way.

It is understood, of course, that the slice preparation is unsuited for any type of filling other than the inlay, and this only when made of hard casting gold.

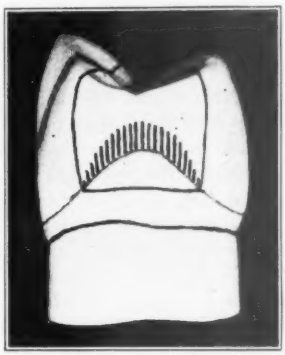


Fig. 7.—Outline of box preparation on mesial surface which will satisfy requirements for prevention of recurrence of decay.

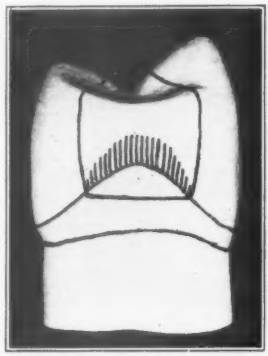


Fig. 8.—Outline of box preparation on distal surface which will satisfy requirements for prevention of recurrence of decay.

Those who advocate the slice preparation claim for it the following advantages over the type to which we have chosen to apply the term "box": 1. It increases retention. 2. It eliminates need of flaring in order to carry out the requirements of extension for prevention. 3. It saves time. 4. It conserves tooth tissue. 5. Less injury is caused to the enamel in finishing the margins. 6. There is more assurance against recurrence of decay at the gingival aspect. 7. The prepared cavity is a

greater distance from the pulp and therefore the chance of injury to the pulp is lessened.

Drs. Gillett and Irving seem to single out as the chief advantages of the preparation the ability to finish margins with a minimum of injury to the enamel and greater assurance against recurrence of decay at the gingival aspect.

DeForest Davis and J. J. Travis have apparently emphasized greater protection for the pulp.

In the apparent absence of experimental evidence either to substantiate or to disprove the claims made for the slice preparation, I have sought to devise means whereby certain comparisons of the two preparations might be made.

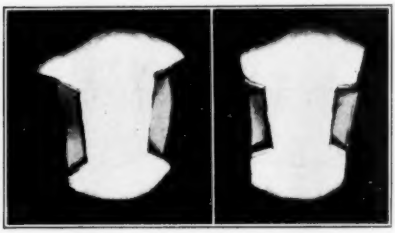


Fig. 9.—Two cavity preparations viewed from occlusal aspect, the proximal aspects only being prepared.

Data bearing on (1) the amount of tooth substance involved, (2) the extent of cavity margins and (3) proximity to the pulp have been assembled, and this discussion concerns itself with those data and the means whereby they have been obtained.

The obvious impossibility of securing two natural teeth exactly alike, or which would be conceded to be so, made it necessary to use plaster models. Those made from Strosnider molds were selected; first, because of their close resemblance to the natural teeth from the standpoint of anatomy, and, secondly, because they are made in metal forms, giving reasonable assurance of the likeness of all teeth made from the same mold.

For this experiment, the upper first bicuspid was selected. Because of the greater convexity of the distal surface as compared with the mesial, an opportunity was afforded for comparison of preparation in two such surfaces. A three-surface, or mesio-occlusodistal cavity, was therefore taken as the type on which data were to be obtained.

Areas considered representative of the susceptible regions were indicated on the mesial and distal surfaces. (Figs. 1-2.)

As a means of locating the susceptible areas in corresponding positions on the two teeth in which the preparations were to be made, a plaster impression of each proximal surface was taken, including within the impression that part of the crown almost to the contact point and an equal portion of the tooth apically from the gingival line. Each of these impressions was trimmed to form a templet the occlusal border of which coincided with the line indicating the gum margin. The templets were placed in position on the tooth on which the susceptible areas had been defined and their buccal and lingual terminations indicated. (Figs. 3-4.) The templets were then carried to the teeth in which the preparations were to be made, and the gum margin borders of the susceptible areas were thus located in proper position. (Figs. 5-6.)

The outline for the box preparation designed to prevent recurrence of decay in the mesial surface is shown in Figure 7; that for the distal is shown in Figure 8.

The box preparation considered here is presumed to have been made according to the method advocated by G. V. Black, except that, in the proximal extension to the gingival aspect, a No. 34 inverted cone bur has been used, this bur being 0.4 mm. less in diameter than that used by

Dr. Black. Measurements of ten ground sections of bicuspids gave an average thickness of the enamel at the level of the gingival walls of such a preparation as 0.428 mm. This measurement plus 0.6 mm., the diameter of a No. 34 bur, represents the mesiodistal depth of the preparation at the level of the gingival wall, or 1.028 mm. The model used in this experiment being one of five and one-half diameters, five and one-half times 1.028 mm., or 5.654 mm., represents the correct depth for such a preparation in the plaster tooth. The prepared cavity, aside from mesiodistal depth, differs in that the buccal and lingual walls are made to flare outward in single planes instead of in two planes as described by Dr. Black for gold foil. Only the occlusal and the gingival cavosurface angles are beveled.

The slice preparation shown is of the saucer type, retention being provided by a proximal box form. This retention at the level of the gingival wall is made on a scale to represent a mesiodistal depth of 0.8 mm. in a one-diameter tooth.

The two preparations carried to the

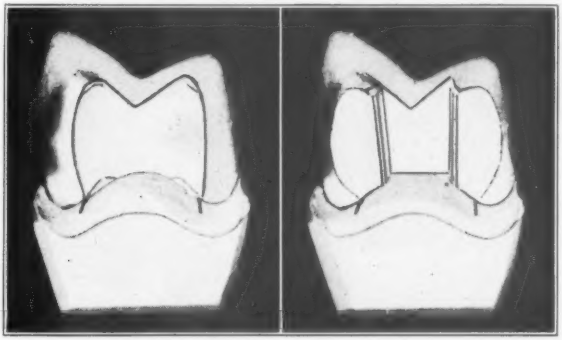


Fig. 10.—Templets in position on mesial surfaces as a check to determine correctness of extension.

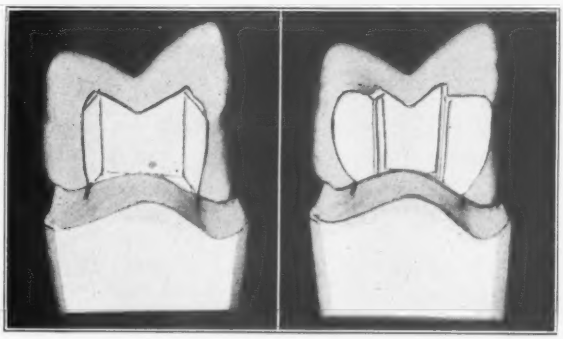


Fig. 11.—Templets in position on distal surfaces as a check to determine correctness of extension.

point of determining the amount of tooth substance involved in the proximal portions are shown in Figure 9.

With the preparations carried to the point shown in Figure 9, the proximal templets were again placed in position to determine whether the proper extension had been made. (Figs. 10-11.)

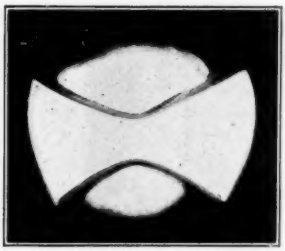


Fig. 12.—Templet on occlusal aspect to determine buccolingual width of cavity in region of transverse ridge.

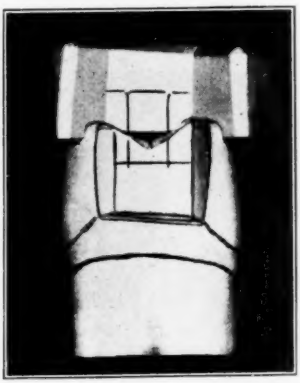


Fig. 13.—Occlusal templet from which lines have been projected to intersect line indicating level of pulpal wall.

In making a comparison of the two preparations, it was necessary to make the occlusal portions alike in buccolingual width through the transverse ridge, and by laying the pulpal walls at the same level.

For determining the buccolingual width, an occlusal templet of plaster was made, having as its width over the transverse ridge a measurement considered approximately correct for the preparation in this region. With the aid of this templet, the midportion of the occlusal outline was made on each tooth. (Fig. 12.)

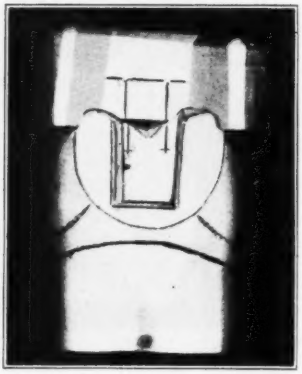


Fig. 14.—Two points determining level of pulpal wall of slice preparation.

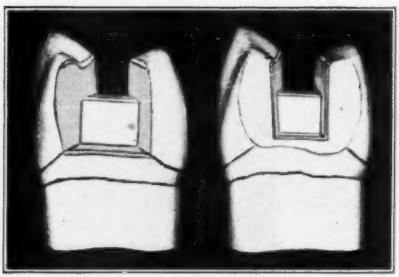


Fig. 15.—Two completed cavities.

On the axial walls of the box preparation made thus far, lines were drawn to indicate the location of the pulpal wall. A plaster templet made to include the two cusps and the middle third of the occlusal surface was placed in position on this tooth, and lines were drawn approximately parallel with those indicating the

level of the pulpal wall. From the lines on the templet, other lines were projected to intersect those on the axial walls. (Fig. 13.)

The templet was then carried to the slice preparation and the lines projected to the axial walls. By means of dividers, two points of the pulpal wall were located. (Fig. 14.)

A line connecting these points indicated a level corresponding to that of the pulpal wall of the box preparation. The two completed preparations are shown in Figure 15.

Axiomesiodistal plaster sections were made to illustrate the two preparations as they would appear in longitudinal view. For the purpose of locating the various parts of the preparations on these sections, the following apparatus was constructed: A modeling compound coping was made to fit the occlusal. In the center of this coping, a threaded shaft was embedded so as to lie in line with the

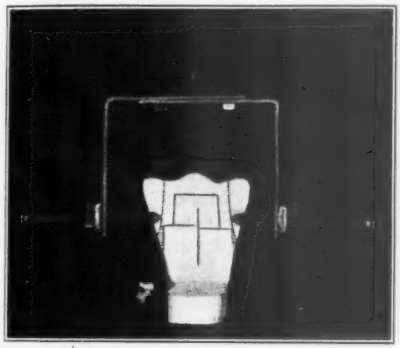


Fig. 16.—Locating slice cuts by means of calipers.

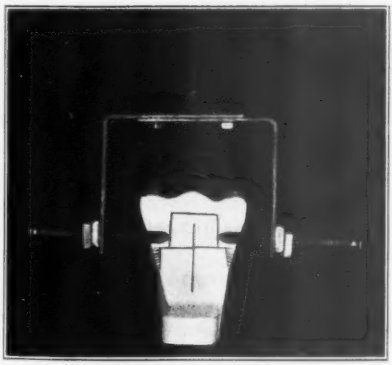


Fig. 17.—Locating axial walls of box preparation by means of calipers.

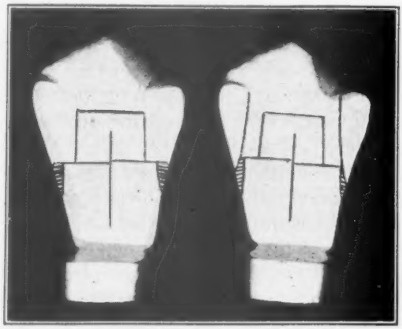


Fig. 18.—Two cavities in section.

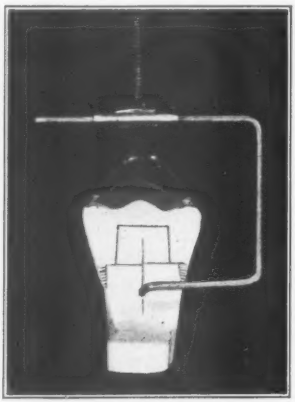


Fig. 19.—Pointer used in locating axial line of tooth.

long axis of the tooth. Two lock nuts on this shaft made it possible to fix u-shaped calipers at various levels. By means of these calipers, a series of points lying in the slice cuts were located and their positions transferred to one of the axiomesiodistal sections. By connecting these points, the slice cuts were defined. (Fig. 16.) Similarly, two points in each axial wall were located and their positions transferred as were the points in the slice cuts. (Fig. 17.) In this way, the sectional views of the two preparations were obtained. (Fig. 18.)

For the purpose of making comparative measurements of the mesiodistal depths of the two preparations, a line indicating the long axis of the tooth was drawn between the mesial and distal surfaces on the section, showing the box preparation. A pointer attached to the threaded shaft in the compound coping served to locate two points in the long axis (Fig. 19), which were transferred to the section showing the slice preparation. A line connecting these points located correctly the long axis in this section. Lines were drawn perpendicular to the long axis and terminating at the points farthest gingivally in each preparation. The length of these lines may be taken as a measure of the relation of the two preparations to the pulp.

RESULTS

Comparison of the amount of tooth substance involved in the two preparations when only the proximal portions were included (Fig. 9) showed a loss of 9.6495 gm., or 12.21 per cent, in the box preparation; while the loss in the slice preparation was 8.8918 gm., or 11.25 per cent. Similar comparisons on completion of the preparations showed a loss of 11.6954 gm., or 14.79 per cent, for the box, and 10.5189 gm., or 13.31 per cent, for the slice.

Measurements taken to determine the extent of the cavity margins showed a total of 234.40 mm. for the slice preparation and 219.65 mm. for the box, a difference of 14.75 mm., or a 6.71 per cent greater extent of cavity margin in the case of the slice preparation.

The perpendicular distance from the axial line to the axial wall at the gingival aspect of each cavity on the mesial aspect was found to be 9.20 mm. To the axial wall on the distal aspect of the box preparation, this distance was found to be 9.34 mm.; while, in the case of the slice preparation, it was 8.14 mm., a difference of 1.20 mm. Expressed in a comparative way: The distal axial wall of the slice preparation lies 12.84 per cent nearer to the axial line than that of the box preparation.

CONCLUSIONS

1. The amount of tooth substance saved through the use of the slice preparation gives it slight preference over the box type.

2. Greater extent of margins in the slice preparation lends to greater ability of mechanical imperfection in this vulnerable part of the restoration and increases the possibility of recurrence of decay.

3. There is nothing in the observations made to support the contention of some that the approach toward the pulp is less in the case of the slice preparation than when the box type is used. On the contrary, if the surface to be restored is markedly convex, the approach may be much closer.

DISEASES OF THE ORAL CAVITY*

By SAMUEL FELDMAN, M.D., New York City

WHILE dentistry is supposed to be limited to the teeth and gums, this specialty and that of dermatology so often overlap that it becomes necessary for those who practice either branch to have a clear concept of all disorders and diseases which may occur in the mouth.

Syphilis may attack any region or structure of the human body. This holds good also for the oral cavity. It is needless to tell you that syphilis is an infectious disease. It is of such great import that I intend to dwell on it at great length. The first sign of the disease occurs about one month after exposure to infection. It consists of a hard papule that becomes eroded and is converted into a smooth red ulcer, which exudes a clear serum. Pus is never present unless the lesion is secondarily infected. This primary lesion of syphilis is called chancre. In nine cases out of ten, the chancre occurs about the genital region, and somewhat less than 10 per cent are extragenital. The greater number of extragenital chancres occur on the lips, and only rarely are they seen on the tongue, tonsils and gums.

Extragenital chancres may occur in any region of the body, sometimes in the most unexpected locations. I saw a girl about 12 years old with a chancre on the knee. She also had scabies. She assisted her parents in a hat check room, where she handled infected clothing, transferring the syphilitic infection by scratching.

A Bronx dentist was referred to me by his family physician for treatment of a condition which he diagnosed as a roentgen-ray burn of the wrist. It turned out to be a chancre. The patient, by that time, had fully developed secondary lesions on the body. He had been infected by carelessly handling a syphilitic patient. Fortunately, he responded to treatment, and his family escaped infection.

Chancre of the lip can easily be mistaken for epithelioma. In the latter, the onset is much slower and the lesion is harder and can persist for a long time without breaking down. The ulcer formed is not smooth, but has an irregular base. The regional lymphatics are very early involved in chancre, but late in epithelioma, and, finally, the finding of *Spirochaeta pallida* makes the diagnosis of syphilis certain.

Spirochaeta pallida is a corkscrew-like organism which is found in large numbers in the initial lesion. When the chancre is located in the mouth, it often becomes macerated and secondarily infected so that it loses its characteristic features and is unrecognizable. To still further complicate matters, there are several harmless spirochetes usually found in the oral cavity which can be mistaken for those which cause syphilis. These organisms so closely resemble *Spirochaeta pallida* that it takes an expert to tell them apart. There is one great difference. When the examination is made by the

*Read at a meeting of the Bronx County Dental Society, Oct. 3, 1933.

dark-field method, *Spirochaeta pallida* is seen moving slowly and its movement is described as that of boring, while the other spirochetes move very rapidly across the field, the movement resembling that of the lashing of a whip. The spirochete of syphilis also differs from most of the others in that its spirals are closer together. In other words, if we assume that spirochetes are of equal length, more spirals can be counted in the spirochete of syphilis than in the others. The microdentium is a short, coarse organism. The macrodentium is next in size, and the buccalis is large and coarse.

Even if the patient receives no treatment, the chancre heals within one month, but, at that time, the secondary eruption will appear on the body. In the mouth, there may be an eruption of grayish macerated papules, called condyloma latum; but, more often, there are gray patches which look like spots painted with silver nitrate on the mucous membrane. These lesions are called mucous patches. Both forms of secondary syphilitic mouth eruptions are very infectious. Occasionally, mucous patches are infiltrated and they may be eroded. An observer with limited experience may easily confuse them with aphthae, herpes, erythema multiforme, pemphigus and Vincent's infection. Fissures occurring at this stage of the disease at the angle of the mouth may be mistaken for a condition which is known as perléche.

This disease starts as a grayish thickening on the mucous side of the commissure of the mouth. From there, a slight erythema extends about 2 to 3 mm. on the cutaneous side. When the disease progresses, there is a bluish, grayish, mother-of-pearl-like discoloration of the mucous membrane and a wedge-shaped erythematous and scaling patch on the cutaneous side. Usually, one or two fissures are present at the angle of the mouth, and, on that account, the condition is occasionally mistaken for syphilitic rhagades. The disease has recently been proved to be due to yeasts, or yeast-like organisms, such as monilia, oidium and cryptococcus.

As is the case in all fungus diseases, it is difficult to eradicate the infection in perléche, and recurrences are frequently met with. Treatment must be persistent. It consists of repeated painting with silver nitrate or, better still, searing of the diseased area with the monopolar endothermy needle.

Thrush or sprue is another disease which is due to the above-mentioned organisms. These fungi are round or oval and reproduce by budding. Some of them grow mycelia or threads, while others do not. The disease occurs in the form of white threads which unite to form a network. This network may form individual patches or it may unite to form a covering for the entire mucous membrane of the mouth and tongue. The patch can easily be removed, and there is rarely any bleeding. The condition is quite amenable to treatment, which consists of the removal of the coating and the application of mild antiseptic mouth washes. If the condition is allowed to persist for a long time, a chronic glossitis results. This glossitis is a superficial inflammation of the tongue and there should be no difficulty in differentiating it from syphilitic glossitis, which has a tendency to involve the deeper structures.

As syphilis progresses, one may find infiltrated patches anywhere on the mucous membrane of the mouth. These may be white and enamel-like, and may be marked by furrows. Occasionally, they ulcerate and leave a bleeding surface. They may disappear and reappear, or become chronic and stationary. One must learn to differentiate them from the nonsyphilitic lesions of the mouth which also are seen as white patches on the mucosa.

Lichen planus is one of these diseases. It occurs on the body as shiny violaceous papules and patches, which itch extremely. In the mouth, it occurs on the buccal mucosa on a line with the teeth and also on the tongue. The lesions are milky white shiny papules which may run together to form a patch. This patch is readily mistaken for leukoplakia, which is apt to occur in the exact location where lichen planus occurs.

Leukoplakia occurs on the tongue and occasionally on the buccal mucosa, in the region of the so-called smoker's triangle. It starts as a grayish or whitish patch of irregular size or shape. Several patches may coalesce and, in this manner, involve large areas, even the entire tongue. The papillae become obliterated and there is a disappearance of all the natural grooves of the tongue. In severe cases, the patch may become several millimeters thick, hard, inelastic and pearly or snow white. The surface may be furrowed or fissured and there may be verrucous protuberances. Although leukoplakia is common in syphilis, it is not a syphilitic manifestation in the strict sense of the word. The use of tobacco is the commonest cause, particularly in the presence of syphilis, and for that reason it was formerly limited almost entirely to the male sex. Thanks to sex equality, it is becoming quite common in women. Dental caries, the sharp edges of teeth, false teeth, alcohol and condiments may cause the condition in nonsmokers. Cancer is an aftermath, usually of the squamous cell type, and very malignant. It is difficult to predict the chances for the occurrence of cancer, or for recovery, in any case of leukoplakia. An extensive lesion may exist for years without causing cancer, while a limited and apparently insignificant white patch may be rapidly followed by cancer. The verrucous form is supposed to be the type of lesion which most commonly predisposes to cancer. It is impossible to tell by the appearance of the patch whether it is due to syphilis. If there are smooth atrophic patches at the same time, or if there is a fibrosis of the tongue appearing simultaneously with the leukoplakia, it is usually due to syphilis.

To treat leukoplakia, one must at first do away with all sources of irritation in the mouth, such as sharp teeth, the use of alcohol, etc. In leukoplakia which appears on a syphilitic base, vigorous antisyphilitic treatment should be instituted. The patch itself should be destroyed by means of the endothermy needle. Early cases are greatly benefited by roentgen-ray treatments.

Sclerotic glossitis is a fibrosis of the tongue which occurs in old cases of syphilis. There may be irregular lobulations, that is, prominent elevations separated by deep grooves which unite in a network. The organ is wine-colored and devoid of papillae. This condition is frequently confused with a congenital malformation of the tongue known as scrotal tongue. The tongue is lobulated and fissured. Its surface is covered with filiform papillae. The tongue is soft; there is no pain, and the condition is absolutely harmless and lasts forever.

Fibrosis in the third stage of syphilis may be primary, but more often it is the result of healing of gummas. The gumma is typical of the tertiary stage of the disease and may occur long after the initial infection, often as long as twenty or thirty years. The lesion is a swelling which has a tendency to break down and form a painless ulcer, which heals with difficulty, leaving a scar behind. The breaking down of a gumma may cause terrific destruction in the oral cavity. It may attack the jaw bones, but particularly the hard palate, causing perforation. A gumma occurring on the gums may be mistaken for an alveolar abscess and in-

cised. The wound, in this case, heals with great difficulty unless antisyphilitic treatment is given.

Congenital syphilis may present any of the tertiary manifestations of syphilis in addition to certain deformities which are due to the retardation of development caused by infection. Prominent among these deformities are Hutchinson's teeth. This is a malformation of the upper central incisors of the permanent set. The teeth are separated and peg-shaped, and the incisor edge is grooved. The deformity is due to the failure of the middle denticle to ossify. Peg-shaped teeth, without notching of the incisor edge, and eroded teeth, especially when accompanied by a high arched palate, usually denote congenital syphilis. The mulberry molar of Fournier has a hypoplastic crown, an irregular occlusal surface and defective cusps. Caries develops early. The tubercle of Carabelli is a bony projection from either side of the first molar. Gummas and areas of ulceration in the mouth are not uncommon in congenital syphilis. The syphilitic ulcer with its granulating base resembles tuberculosis.

Tuberculosis may be primary in the mouth, or it may complicate tuberculosis of the lung from infected sputum. The disease may be superficial and involve only the mucosa, or it may be deep and invade the underlying structure. The usual location for the superficial type is the soft palate, uvula and pharynx. The area involved is livid red and edematous and is studded with yellowish nodules, which ulcerate, producing an irregular yellowish lesion resembling that of aphthous stomatitis. The ulcers may run together to form irregular excoriations. The disease is apt to cause severe pain. When the deep form of tuberculosis invades the tongue, there may be a deep seated nodule which is indistinguishable from a gumma or a deep-seated tumor. This tuberculous gumma has a tendency to break down and form deep fissures, which are sometimes called tuberculous rhagades. The usual type of deep seated tuberculosis may be located on the tongue, the lips, the gums and cheeks. There is a deep-seated infiltration made up of individual tubercles. The surface of the lesion breaks down to form an ulcer with a grayish or greenish yellow granulating base. The ulcer is sharply demarcated, and yellowish nodules are seen on the border of the lesion. These nodules may break down to form new ulcers and, in that manner, involve large areas, producing lesions with serpiginous outlines quite indistinguishable on superficial examination from syphilitic ulcers.

In the days when mercury was the principal drug in the treatment of syphilis, mercurial stomatitis was of frequent occurrence. At present, it is less common, for bismuth, for the most part, has been substituted for mercury. In mercurial stomatitis, the gums become painful, swollen and spongy, and bleed readily. They finally break down, necrotic ulcers resulting. This process may extend to the adjacent mucous membrane. The breath becomes foul, and the patient is unable to eat because of the pain. Recession of the gums, falling out of the teeth and, occasionally, ankylosis of the jaw from bone necrosis may be the sequelae. The only available local treatment for mercurial stomatitis is palliative, consisting of soothing mouth washes and avoidance of irritation. Daily intravenous injection of sodium thiosulphate helps in the elimination of the mercury from the system. This method of treatment is useful in all cases of poisoning by the heavy metals, such as arsenic, lead and gold.

The symptoms of mercurial stomatitis are so similar to those of "trench mouth," or Vincent's infection, that it is almost impossible to tell them apart. The latter is

a specific form of infection of the mouth and it is due to the spirillum of Vincent, which differs from the spirochete of syphilis in being longer and coarser and having irregular spirals. It lives in symbiosis with the fusiform bacillus, which is a very large spindle-shaped organism. The finding of the two organisms together is the only means of making a diagnosis of Vincent's infection. The disease often complicates mercurial stomatitis, and may cause continued suffering of the patient after the mercury reaction has subsided. Vincent's infection also starts on the gums and may spread to any part of the buccal mucosa, including the tongue. The lesion produced is a superficial ulceration, sometimes covered by a membrane which can easily be removed, its removal exposing a raw surface. The disease is apt to produce severe pain. It may have its starting point in infected tonsillar crypts, carious teeth and spongy and bleeding gums. Good results are obtained from treating Vincent's infection with local applications of arsphenamine powder or paste, also from the intravenous injection of arsphenamine. Other drugs, such as sodium perborate and methylene blue, occasionally yield good results. I obtained excellent results from the use of the Kromayer lamp.

There is a comparatively large number of either local diseases of the mouth or general dermatologic diseases which involve the mucous membrane of the mouth also, and are apt to produce painful ulcers. The dentist is not infrequently consulted for these conditions. I believe, therefore, that he should have at least a working knowledge of the diagnosis and treatment of any disease which may occur in the oral cavity.

Aphthous stomatitis is one of them. It starts as one or more small yellowish erosions which are usually surrounded by a zone of hyperemia. It may be associated with upset stomach and slight fever. The process has a tendency to recur.

Erosions in the mouth may be due to vesicles which come and go for years without producing any ill-effect on the general health of the individual. These lesions are the counterpart of herpes labialis (fever blister or cold sore). Herpes may occur simultaneously in both locations. The disease is frequently preceded by pain, or a tense burning sensation. A red spot appears, and this is soon converted into a group of vesicles, which, after a while, dry up to form a brown crust. One should be careful not to mistake these vesicles for the bullae of pemphigus.

Pemphigus is a serious constitutional disease with symptoms on the skin and mucous membrane. There may be blebs in the mouth long before the appearance of the lesion on the skin, and, when this is the case, it may be mistaken for pyorrhea. As this disease very often terminates fatally, a mistaken diagnosis may prove very embarrassing to the dentist. When the disease is limited to the mouth, the diagnosis is a very difficult process because all bullous lesions in the mouth look very nearly alike. A careful inquiry into the history of the patient, as to previous attacks, loss of weight and failing health, will aid materially in the diagnosis.

The disease most commonly mistaken for pemphigus is erythema multiforme. This is also a general disease, occurring on the skin and mucous membranes. It is a multiform erthematous eruption with macules, papules, vesicles and erythematous patches. It may become bullous, and, as in pemphigus, lesions in the mouth may precede those of the skin.

Eruptions due to drugs must be kept in mind in any case of bullous lesions and

erosions occurring in the mouth. Phenolphthalein, pyramidon, barbituric acid and its derivatives, such as luminal, allonal and amytal, are capable of producing erythematous patches and bullae in the mouth. Some of the chemicals used in mouth washes and tooth pastes are capable of producing violent reactions on the lips and buccal mucosa. In luminal tongue, the organ is denuded of epithelium, and is red, shiny and completely devoid of papillae.

Geographic tongue is a condition in which red patches occur on the dorsum of the tongue, in front of the circumvallate papillae. It has a yellowish white border and the lesions give the impression of a broken down bleb. In this manner, the condition resembles erythema multiforme. Several patches may join to form circinate figures. This configuration changes constantly. There are no subjective symptoms outside the fear that one has that the condition may become serious. The maladay may start in childhood and may last indefinitely, even throughout life. Roentgen-ray treatments occasionally help the condition.

A manifestation quite similar in appearance, objectively much less prominent, but with severe subjective symptoms, such as burning pain entirely out of proportion to the appearance of the lesion, is of more serious import to the patient. This ailment is known as Moeller's glossitis. The patch is red and shiny, with a sharp margin, only slightly whiter than the surrounding mucous membrane, and usually involving the tip and sides of the tongue. The pain is so severe that the condition is frequently called neuralgia of the tongue. It has recently been proved that this disease is one of the pathognomonic signs of pernicious anemia.

Bleeding of the gums is not infrequent in pernicious and very severe anemia, leukemia, purpura and some of the deficiency diseases, such as scurvy. Furthermore, caries of the teeth, gingivitis and ulceration of the gums occur in pregnancy, owing to disturbances in the calcium metabolism.

In leukemia, there may be a leukemic infiltration of the gums, which become thickened and present a peculiar characteristic pallor. Ulceration of the gums and the mucous membrane of the mouth and lips is of frequent occurrence.

Occasionally, the foliate papillae along the side of the tongue in the region of the last molar become hypertrophied. This condition is usually accompanied by pain, and, in neurotic women, there is apt to be fear of cancer. The patient usually blames the tooth for the trouble, and many an innocent last molar has been extracted on account of it. Roentgen-ray treatments have been helpful in many cases. Some cases resist all methods of treatment except the actual destruction of the papillae by means of thermocoagulation.

Ulceration and pain in the region of the last molar, as well as in other locations in the mouth, may be due to improperly fitted dentures. It may occur from irritation of all kinds, such as the abuse of alcohol, condiments and tobacco. It may also occur from galvanic currents produced by the various metals which the dentist uses in the mouth.

Human saliva is a good electrolyte through which metallic electrons circulate from a higher to a lower electropotential. Thus, in every oral cavity which contains dentures such as plates, bridges, crowns and fillings of dissimilar metals, there is a complete electric battery. Electrons from the positive metals flow to, and are deposited on, the negative metals. This electric current causes irritation in the mouth in the form of chronic inflammation, blanched or gray-

ish patches, erosions and ulcers. Leukoplakia may appear on the gingival or buccal mucosa, adjacent to the metallic dentures. There is an astringent, metallic taste in the mouth; a burning sensation; salivation and an electric shock when the two dissimilar metals come in contact. The lesions which are produced may be indistinguishable from any ordinary trauma produced by rough teeth, infection, tobacco and acid foods. When lesions from any of the above-mentioned sources are present, galvanic currents will help to aggravate the symptoms, the severity of which depends on the amount of surface of the dissimilar metals, chemical variations in the saliva, local tissue resistance and the relative position of the metals in the electrometer series. Because dental amalgam contains a large percentage of zinc, it is strongly positive to gold and may therefore cause trouble if placed opposite a gold cap. Referring to the table accompanying, one can see that zinc is very far from gold in the series, while platinum and gold are very close together, and therefore will cause very little trouble if placed together in the mouth.

ELECTROMETER SERIES

Positive End	
1. Cesium	15. Cobalt
2. Rubidium	16. Nickel
3. Potassium	17. Tin
4. Sodium	18. Lead
5. Lithium	19. Hydrogen
6. Barium	20. Copper
7. Strontium	21. Arsenic
8. Calcium	22. Bismuth
9. Magnesium	23. Antimony
10. Aluminum	24. Mercury
11. Manganese	25. Silver
12. Zinc	26. Palladium
13. Cadmium	27. Platinum
14. Iron	28. Gold
	Negative End

The subject would be incomplete without at least brief mention of several of the conditions which appear on the lips. These structures form the borderline between the skin and the mucous membrane, and the point where the structures meet is called the mucocutaneous junction. Naturally, disease of the skin, as well as of the mucous membrane, may extend to the lips.

Inflammation, scaling, crusting and fissuring of the lips which occurs in eczema, may be a part of a general eczema, or may invade the lips alone, in the case of children who are in the habit of licking their lips.

Cheilitis exfoliativa is a condition in which there is scaling of the lips to such an extent that the lining can be removed in the form of large plaques. It is due to a condition known as seborrhea, and it may be associated with that disease on the face.

Cheilitis glandularis is an hypertrophy of the mucous glands of the lips. There are small nodules about the gland opening, from which a mucopurulent secretion can be expressed. This disease readily yields to roentgen-ray treatments.

Occlusion of the orifice of the mucous glands on the lips or in the mouth causes the formation of mucous cysts. These are hard multilocular vesicles which contain a clear but viscid fluid. They rupture with great difficulty. The best method of treating these cysts is by destruction with the endothermy needle.

Carcinoma of the lips has already been mentioned in connection with chancre. It is extremely common in this location as well as on the tongue. The transition from skin to mucous membrane causes a disturbance in tissue tension which predisposes to cancer in patients who are continually exposed to irritation from smoking, caries of the teeth, etc. It is a peculiar fact that practically all epitheliomas which occur on the lower lip, chin and mouth are of the squamous cell-type and very malignant, forming metastases;

while those occurring on the upper lip and on the face above the mouth rarely metastasize.

Round or spindle-cell sarcomats are connective tissue tumors which may occur anywhere on the mouth or lips. They are deep seated globular swellings resembling gummas, and they are very malignant. The periosteal giant-cell sarcoma which arises from the alveolar process or the socket of the tooth is not malignant, but has a tendency to local recurrence. One should avoid making a biopsy of any mouth tumor, but, wherever feasible, the entire growth should be removed by the endothermy knife, and, if found malignant on sectioning, should be treated by radium and the roentgen rays.

Papilloma of the tongue has the same structure as papillomas anywhere on the skin and mucous membrane, and is nonmalignant. Every papilloma on the tongue, in the mouth or on the lips should be completely removed, as many an early cancer has the appearance of and is indistinguishable from papilloma.

1955 Grand Concourse.

CASE REPORT

By HUGH E. BLACK, D.D.S., La Salle, Ill.

A PATIENT aged 22, came in because a large amount of foul pus was issuing from a fistula in the center of the hard palate. There was also a discharge from the right nostril. A roentgenogram of the anterior teeth revealed a fractured right central incisor with much destruction of bone.

The patient explained that while he was drinking at a water fountain six years previous, a boy had pushed his head downward against the fountain with considerable force.

An interesting feature of the case was that there was no pain or discoloration of the incisor and the patient did not know that there was any trouble until pus began to discharge from the fistula.

The right central and lateral incisors were removed and the cavity was curetted. A steel probe could be pushed through the fistula in the palate into the right side of the nasal cavity. After removal of the teeth and curettement of the cavity, recovery was speedy and uneventful.

Roentgenogram of anterior teeth revealing fracture of the right central incisor.

THE MOLAR TEETH OF NEW BRITAIN MELANESIANS

By M. RUSSELL STEIN, D.D.S., and JULIUS L. EPSTEIN,† New York City

THE accompanying tables contain the metrical data on the molar teeth of a collection of 306 New Britain Melanesian skulls at the American Museum of Natural History. All the specimens included in this study are in a fine state of preservation. The group represents a homogeneous population from the locality of Ralûm. No attempt has been made to draw any conclusions from the comparison of this group with others. This is one of a series of studies on homogeneous populations which are now being conducted at the dental school of Columbia University. The data on different peoples will be published from time to time for their reference value.

TABLE 1.—AVERAGE SIZES (MM.) OF MELANESIAN MOLARS

Upper

	M1			M2			M3		
	Number	Length	Breadth	Number	Length	Breadth	Number	Length	Breadth
Entire Group	306	10.9	12.3	300	10.0	12.3	240	9.3	11.7
Male	153	11.1	12.5	151	10.1	12.5	120	9.2	11.9
Female	153	10.8	12.1	149	10.0	12.0	120	9.5	11.4

Lower

	M1			M2			M3		
	Number	Length	Breadth	Number	Length	Breadth	Number	Length	Breadth
Entire Group	280	9.7	11.3	279	11.1	10.7	261	11.3	10.6
Male	134	11.3	11.4	135	11.2	10.8	133	11.5	10.7
Female	146	7.6	11.1	144	11.0	10.5	128	11.1	10.4

Variability has been computed only on the labiolingual (breadth) diameters of the crowns, because the mesiodistal

†Student, Columbia University School of Dental and Oral Surgery.

TABLE 2.—CROWN INDEX* (MELANESIAN GROUP)

Upper

	M1		M2		M3	
	Number	Index	Number	Index	Number	Index
Entire Group	306	112.9	300	123.0	240	125.8
Male	153	112.6	151	123.8	120	129.4
Female	153	112.0	149	120.0	120	120.0

Lower

	M1		M2		M3	
	Number	Index	Number	Index	Number	Index
Entire Group	280	116.5	279	96.4	261	93.8
Male	134	100.9	135	96.4	133	93.0
Female	146	146.1	144	95.5	128	93.7

$$\text{*Crown Index} = \frac{\text{Breadth} \times 100}{\text{Length}}$$

TABLE 3.—COEFFICIENT OF VARIATION*: LABIOLINGUAL DIAMETERS (MELANESIAN MOLARS)

	Upper			Lower		
	M1	M2	M3	M1	M2	M3
Entire Group	5.53	6.75	8.04	4.92	5.85	7.02
Male	4.86	6.03	8.82	4.96	5.61	6.87
Female	5.32	6.51	8.25	4.66	5.86	7.27

$$\text{*V} = \frac{100 \times \text{S.D.}}{\text{Average}} \qquad \text{S.D.} = \sqrt{\frac{\Sigma d^2}{N}}$$

TABLE 4.—RELIABILITY: COEFFICIENT OF CORRELATION (MELANESIAN MOLARS)

	M1		M2		M3	
	Length	Breadth	Length	Breadth	Length	Breadth
Upper	0.945	0.990	0.973	0.982	0.968	0.959
Lower	0.957	0.948	0.969	0.982	0.980	0.877

TABLE 5.—COMPARATIVE TABLE OF AVERAGE SIZES (MM.)

Upper

People	Investigator	M1 Number	M1 Length	M1 Breadth	M2 Number	M2 Length	M2 Breadth	M3 Number	M3 Length	M3 Breadth
Australians	Campbell		11.4	12.8		10.9	13.1		10.0	12.3
Bantu	Shaw	91	10.3	11.0	91	10.0	11.5	80	9.5	11.0
Bush	Drennan		9.9	10.6		9.7	10.6		8.2	10.3
American White	Black		10.7	11.8		9.2	11.5		8.6	10.6
American White	Stein	211	10.3	11.4	206	9.2	11.6	499	8.9	11.0
Melanesian	Stein	306	10.9	12.3	300	10.0	12.3	240	9.3	11.7

Lower

People	Investigator	M1 Number	M1 Length	M1 Breadth	M2 Number	M2 Length	M2 Breadth	M3 Number	M3 Length	M3 Breadth
Australians	Campbell		12.3	11.9		12.5	11.7		11.9	11.1
Bantu	Shaw	83	11.0	10.5	83	11.0	10.3	66	11.1	10.4
Bush	Drennan		10.9	10.2		10.6	10.1		9.9	9.6
American White	Black		11.2	10.3		10.7	10.1		10.7	9.8
American White	Stein	107	11.4	10.3	224	10.8	10.0	250	10.9	9.8
Melanesian	Stein	280	9.7	11.3	279	11.1	10.7	261	11.3	10.6

TABLE 6.—COMPARATIVE TABLE OF CROWN INDICES

Upper

		M1		M2		M3	
People	Investigator	Number	Index	Number	Index	Number	Index
Australian	Campbell		112.3		120.2		123.0
Bush	Drennan		107.2		110.2		125.7
Bantu	Drennan		108.8		118.0		119.6
Bantu	Shaw	110	107.3	110	111.1	110	118.4
American White	Black		110.3		125.0		123.2
American White	Stein	211	110.7	206	126.1	499	123.6
Melanesian	Stein	306	112.8	300	123.0	240	125.8

Lower

		M1		M2		M3	
People	Investigator	Number	Index	Number	Index	Number	Index
Australian	Campbell		96.7		93.6		93.3
Bush	Drennan		93.7		94.8		97.0
Bantu	Drennan		94.5		93.6		91.2
Bantu	Shaw	100	93.7	100	93.4	100	92.3
American White	Black		91.9		94.3		91.6
American White	Stein	107	90.6	224	92.6	250	89.9
Melanesian	Stein	280	116.5	279	96.4	261	93.8

(length) diameter is so frequently diminished by interproximal abrasion and occlusal wear beyond the contact points. In many instances, teeth had lost as much as 3 mm. in this dimension. The widest labiolingual diameter of the crown is rarely destroyed because it is near the neck of the tooth.

Computations have been made on the group as a whole and on males and females separately. The skulls were classified as male or female by Dr. Shapiro and

Mr. Howells, both of the American Museum of Natural History. The dentition was not used in the criteria for classification.

In the study of large groups, the coefficient of variation is a valuable supplement to average sizes, particularly in making comparisons. The constituents of an average of 12 mm. in one group may range from 6 to 16 mm.; while, in another, they may range only from 11 to 13 mm. The extent and character of the distribution curves of the two groups may differ widely even though the average sizes are the same.

In the upper and lower jaws, the first molars were found to be the most stable in size. The second vary more than the first and the third more than the second. This order of variability was found in all the groups studied thus far.

In all but the upper third molars, the average sizes of the molars of the males were greater than those of the corresponding teeth of the females. Except for the upper third molars and the lower first molars, the female teeth varied more than the male.

Reliability was determined by correlating the results of the remeasurement of a group of forty skulls with the original measurements taken one month before.

TABLE 7.—COMPARATIVE TABLE OF CROWN MODULES* (MM.)

		Upper			Lower		
People	Investigator	M1	M2	M3	M1	M2	M3
Australians	Campbell	12.1	12.0	11.2	12.1	12.1	11.5
Bantu	Shaw	10.7	10.8	10.3	10.8	10.7	10.6
Bush	Drennan	10.3	10.2	9.3	10.6	10.4	9.8
American White	Black	11.3	10.4	9.6	10.8	10.4	10.3
American White	Stein	10.9	10.4	10.0	10.9	10.4	10.4
Melanesian	Stein	11.6	11.2	10.5	10.5	10.9	11.0

*Crown Module = $\frac{\text{Breadth} + \text{Length}}{2}$

MANAGEMENT OF DIFFICULT TEETH*

By J. P. WAHL, D.D.S., New Orleans, La.

BEFORE discussing the management of difficult teeth, it would be wise to determine just what is meant by the term difficult teeth and which teeth should be included under this heading.

Those fully or partially erupted teeth which cannot be dislodged with forceps or elevators after ordinary force has been applied and those which are embedded deeply in the bone (where the application of forceps and elevators is impossible and where surgery is the only possible means for their removal) should all be considered difficult teeth.

In general, difficult teeth may be divided into two classes: 1. Those teeth in which the crowns have fully or partially erupted or those which are partially impacted by other teeth and in which the roentgenogram reveals spread, curved or malformed roots. 2. Those teeth which should be in position in the dental arch, but have not erupted and can be located only with the roentgen rays. All completely impacted, or completely embedded, malposed, teeth would come under this classification.

Twenty-five or thirty years ago, there was no way of determining preoperatively whether a tooth would prove difficult to remove. In those days, there was no other means at our disposal for removing these teeth than by brute force. Consequently, quite a few teeth were broken off and their root fragments left undisturbed.

Today, we have the roentgen rays at our disposal. By their use we can obtain a good film of the case and by their careful study estimate about how much trouble a certain tooth will give us when we attempt to remove it. Then we can plan our technic accordingly. Wherever possible, all teeth that have been condemned to extraction, whether or not we think they will be difficult to remove, should be roentgenographed. Very often, a tooth that looks very simple to remove turns out to be most difficult, and so one would not be able to handle the situation so well without a good roentgenogram, enabling him to plan his technic in detail previous to the operation.

The roentgenogram will disclose the density of the bone and any pathologic changes that might have taken place about the teeth. As stated previously, it will also be of material assistance in the planning and carrying out of a correct technic for the removal of these teeth.

Assuming that we have obtained a good roentgenogram, we should study it thoroughly, paying especial attention to the position of the tooth, the size and malformation of its roots, the condition and amount of bone surrounding it that must be removed before the tooth can be released and the proximity of this tooth or its roots to adjacent teeth or other important anatomic structures, such as the antral cavity, the mandibular canal with its contents and the mental foramen. We

*Read at the Seventy-Fifth Annual Session of the American Dental Association in conjunction with the Chicago Centennial Dental Congress, Aug. 11, 1933.

should then plan in detail the surgical procedure to be used and determine as best we can the necessary severity of these measures.

It now becomes our duty to determine whether the patient is physically fit to go through the ordeal. The patient should be prepared according to the severity of the operation. The preoperative preparation is of paramount importance and the elimination of a great many of the postoperative complications will depend on how well it has been carried out. One of the most important steps in the preoperative treatment is to get a good history.

It is not possible or essential to have a thorough physical examination of every patient operated on, but a good history can be obtained. From the history, an experienced operator can usually determine whether the physical condition of the patient will permit such an operation being performed, select the anesthetic of choice, and decide whether the patient should be hospitalized.

Usually, while giving these histories, patients will divulge, without fail, whether they bled excessively after having teeth or tonsils removed. It is true that they frequently exaggerate this condition, but it is nevertheless a warning that should be heeded. It is always a safe procedure to have a bleeding time and coagulating time test made by a competent physician. Patients with a long bleeding or coagulating time should be treated three or four days previous to the operation or until the bleeding and coagulating time has reached normal. In most cases, calcium lactate, administered in 5 grain doses three times a day, will answer the purpose. Other drugs, such as ceanothin, styptate, fibrogen and hemostatic serum, may also be used. If, after obtaining a history, the operator is in the slightest degree uneasy as to the physical condition of the patient, he should not only advise but even demand a thorough physical examination by a good internist, if necessary giving the patient the reasons therefor. It is advisable to have this examination made by an internist, because dentists are not capable of making such an examination. It often happens, in these cases, that the report returned by the internist indicates that the patient has diabetes, hypertension or some other organic disease or is anemic or a bleeder. In these conditions, it is better to get the advice of the physician before proceeding with the operation that he may share the responsibility. If the patient is a diabetic, he should be treated by his physician until the sugar content of the blood is brought down to normal before he is operated on, as these cases do not heal well if the sugar content is high. If they are properly treated, healing is satisfactory. In cases of anemia, it is often advisable to give a transfusion.

In cases of true hemophilia, the blood of the patient should be typed and a donor selected before operation.

After we have obtained a good history, and have satisfied ourselves that the patient is physically fit to stand the operation, it is essential that we make a careful and thorough examination of the oral tissues. Any lesions found should be treated until the tissues are in as healthy a condition as possible, in order to encourage an uneventful recovery from the operation.

Among the pathologic lesions found in the mouth, Vincent's infection and pericoronitis cause the most concern. Operation should never be undertaken in the presence of a case of acute pericoronitis, as the results might prove fatal. Most of the difficult cases that come under our care are not what might be called emergency cases, but are rather cases in which the operation may be delayed for several

days or weeks; which allows ample time for the treatment necessary to clear up these conditions before operating. I have seen some very sad results of removal or attempted removal of mandibular third molars during an acute infection of the surrounding soft tissues. A young man, aged 25, died of a cavernous sinus thrombosis following the attempted removal of a mandibular third molar, and a man, aged 28, died from the same cause after removal of a mandibular third molar. Both these patients were operated on during the acute stage of pericoronitis. Those of us who are fortunate enough to have hospital connections know the seriousness of these cases, as we have the opportunity of seeing and treating these patients who were so unfortunate as to have some one remove or attempt to remove a tooth during the acute stage of this infection.

Pericoronitis is not limited entirely to the soft tissues surrounding mandibular third molars, but may be found in the soft tissue surrounding any partially erupted tooth. It seems to occur more frequently in the soft tissue of both the maxillary and the mandibular third molars. It is always of a more serious nature when it occurs about the mandibular third molar, owing to the anatomic arrangement of the soft tissues in this particular region, which permits a rapid spread of the inflammation into the neighboring glands and muscles.

Patients whom I have seen with this condition about a mandibular third molar nearly always give a history of one or two previous attacks, each successive attack being more severe than the preceding one. They complain of severe pain, have some difficulty in swallowing and are able to open their mouths only with difficulty. The pulse is rather rapid and weak, the tongue is coated and they usually have fever and chills.

A close examination of the mouth will reveal a partially erupted or partially impacted mandibular third molar, with a deep pocket bucally and distally. The overlying soft tissue will be found to be ulcerated, pus will exude on the slightest pressure and extreme tenderness will be noted. In the more advanced cases, there is swelling on the buccal and lingual surfaces with fluctuation. In some cases, the swelling on the lingual surface extends to the anterior pillar of the fauces, very often being mistaken for a tonsillar abscess.

A speedy cure can be obtained in those cases that are not far advanced, by gently flushing the area between the overlying soft tissue and the crown of the tooth with a warm saline solution followed with a 15 per cent argyrol solution or some other good antiseptic. I have found tincture of metaphen to be very effective in these cases. The patient should be put on a liquid diet in order to give the part rest. The diet should be as nearly alkaline as possible. Instruction should be given to place the ice cap on the face in the region of the third molar for at least fifteen minutes of each hour and to gently irrigate the mouth three or four times daily with a warm antiseptic solution. I have found it very beneficial, in the more severe cases, to remove the maxillary third molar as it lessens the pressure on the congested tissue. In the more advanced cases, these patients should be hospitalized, as surgical interference with extra-oral incisions for drainage often becomes necessary.

As all surgical operations must be performed painlessly, the next question of grave importance to the operator is anesthesia, which has played a very important rôle in the advancement of oral surgery.

Fortunately, there are two forms of anesthesia to be selected, local and general, each having its advantages and dis-

advantages. If local anesthesia is used, it is always well to bear in mind that, for a successful completion of the operation, the parts to be operated on must be thoroughly anesthetized. The choice of the anesthetic agent should be governed by the physical condition of the patient and, in a great many cases, by the pathologic condition of the parts to be operated on. In cases of large cysts of the mandible, in which the body of the bone has been badly shelled out and weakened to such a degree that any slight pressure exerted on it might cause a fracture, it is inadvisable to use a general anesthetic. Pressure exerted on the mandible in placing the mouth gag might produce a fracture. In these cases, it is better to use block anesthesia by either the intraoral or the extraoral route. The difficulties to be encountered by the operator in doing this class of work should have much bearing in the selection of the anesthetic. Any operation about the mouth, no matter how difficult, can be performed just as well under a general, if properly administered, as under a local anesthetic, provided the patient receives proper premedication, which should be the rule whether a local or a general anesthetic is employed.

In these cases, if the patient has received proper premedication and a general anesthetic has been administered, the anesthetic effect will be much smoother, the patient will rest better after the operation, and there will be less postanesthetic nausea; while, in cases wherein a local anesthetic is used the patient will be calmer and more cooperative. The anesthetic should be administered in such a way that the throat can be completely packed off to prevent ingress of saliva, blood or other material to the trachea. I see no reason that the operator cannot take his time and carry out his technic with as much precision as under local anesthesia. Of course, there is more bleeding to contend with under general anesthesia, but this can be controlled to a degree by administration of 2 c.c. of fibrogen or some other hemostatic agent from thirty to forty-five minutes before the operation. All difficult cases to be operated on under a general anesthetic should be hospitalized. I have long since discontinued operating in these cases under general anesthesia in the office, as the risk is far too great, and hospitalization insures a more rigid adherence to the course of treatment prescribed. General anesthesia should be used in all those cases wherein injection of a local anesthetic might spread the infection.

In my experience, as the majority of these cases have to be handled in the office, conduction or block anesthesia with procaine is the anesthetic of choice.

It is well to remember that if block anesthesia is used, one should be very careful that the solution is sterile, and great care should be exercised not to inject the solution into the muscle. The use of a nonsterile solution will cause pain, swelling, and other signs and symptoms that follow infection. Injection of the solution into the muscle will usually cause trismus. There is also great danger of breaking the needle while forcing it through muscular tissue. The procaine solution should not contain an excessive concentration of epinephrine, especially when used on patients with high blood pressure, as the procaine acts synergistically with epinephrine in producing vasoconstriction. If used in too strong a concentration, serious local or systemic reactions may follow injection. In patients with high blood pressure, heart disease or goiter and in those who are very old, it is better to use a solution of procaine without epinephrine.

Before attempting to remove difficult teeth, whether of Class 1 or Class 2, it is imperative that a good roentgenogram be

obtained. This roentgenogram should be studied thoroughly from every angle and the operative procedure should be planned in detail. The density of the bone should be noted and, as nearly as possible, the amount that must be removed before the tooth can be freed, the operator always bearing in mind that at no time should brute force play any part in the removal of these teeth. We should, so to speak, formulate a mental picture of the incision that will be necessary in order to produce a flap of sufficient size to enable us to visualize the entire field of operation. I find it always advantageous to have the flap a little too large rather than too small.

The next important point to be borne in mind in connection with surgical procedure is asepsis. The patient's mouth should be put in a condition as nearly aseptic as is possible before the anesthetic, whether local or general, is administered. The teeth should be thoroughly cleaned with sterile sponges, after which the teeth and gums should be mopped with 3 per cent iodine in glycerine. The face is then wiped with a 70 per cent solution of alcohol, and a suitable cap is placed about the patient's head. If the operation is to be performed in the office, an apron should be placed about the patient to protect the clothing and keep the hands away from the field of operation. The operator's hands should be thoroughly scrubbed and he should wear a sterile gown and rubber gloves. All instruments and dressings should be thoroughly sterilized.

The anesthetic should now be administered. After anesthesia is obtained, if general, the patient's throat should be well packed, to prevent saliva, blood or other material from escaping into the trachea. This precaution will often prevent otherwise disastrous after-effects.

The cheek is retracted by the assistant and a clean-cut incision is made through the mucoperiosteum to the bone with a very sharp knife. The mucoperiosteum is then elevated with a suitable periosteotome and the flap held back with a retractor. Flaps of the hard palate, in cases of lingually displaced impacted cuspids, can be retracted very nicely and held out of the way with a heavy piece of silk B. B. dermal suture material. In making an incision for a flap, care should be observed to make it far enough away from the edge of the bone that will be left after the operation, in order to permit the edge of the flap after being coaptated and sutured to rest on solid bone rather than on the edge of the excavated bone. This is very important as we know that the future shape of the part operated on will depend on whether the mucoperiosteum is properly replaced, maintained in position with sutures and supported by a sufficient amount of bone to prevent caving in. Caving in of the mucoperiosteum will defeat this purpose. In making a labial flap for a deeply embedded cuspid impaction, I use an angulated line incision rather than a semilunar. The angulated incision enables one, in coaptating the flap, to bring the tissues back to the same position that they occupied previous to the operation, without any guesswork. It is important that the flap be large enough that, when it is retracted, the operator will have a clean view of the entire field. It is impossible to carry out a good surgical technic in a field that is improperly exposed, as is the case when a small flap is used. The flap should be held out of the way with a suitable retractor, and at no time should the tissue be traumatized. The osseous tissue should be carefully dissected away. To remove the osseous tissue, some operators prefer the surgical drill, others the hand-cutting instruments; while another group prefer the chisel and mallet. I have always obtained much better results with the chisel

and mallet. No matter which technic is used, one should always remember that all bone-cutting instruments should be sharp enough to cut without exertion of much force on them.

A great deal of the after-pain experienced by some patients is caused by the use of dull cutting instruments. Sharp instruments not only lessen the postoperative pain, but also shorten the time required to complete the operation. After a sufficient amount of bone has been removed to permit easy access to the tooth, a suitable exolever placed in proper position should dislodge the tooth without any exertion. After the tooth has been lifted out, great care should be exercised to remove all loose pieces of bone and any sharp edges. All pathologic tissue should be gently removed with sharp curets. The wound should then be flushed with a warm saline solution. The excess solution should be mopped up with sponges and the surface of the bony cavity examined to determine whether there are any excessive bleeding points. If any bleeding points are found, they can be stopped very easily by burnishing with a round burnisher. The force used in burnishing plugs the small openings and stops excessive bleeding. This precaution, if heeded, will prevent a great deal of the troublesome postoperative hemorrhage. The flap is then brought down into place and sutured. In suturing, one should be very careful not to stretch the tissue by putting too much tension on it. It is not good practice to try to make the tissue close a gap that it did not originally cover, as in the case of partially erupted, impacted mandibular third molars. In these cases, a small piece of sterile gauze tape moistened with compound tincture of benzoin and placed lightly in the wound between the edges of the flap makes an ideal dressing and prevents tension.

Wherever possible, immediately after completion of the operation and before the sutures are placed, it is advisable to make a roentgenogram of the part operated on, especially in operations on the mandible, and to check up on the findings, as it often so happens that pieces of filling material, instruments or tooth gain access to the wound and are overlooked by the operator and permitted to remain. If these pieces are small, they might not do any harm; but if they are large, they might irritate the soft tissues enough to cause a breaking down and suppuration, and prevent healing. The patient might consult another surgeon, who would advise a roentgenogram. If the roentgenogram should reveal the presence of a piece of tooth, a filling or an instrument, an explanation to the patient by the original operator would be very embarrassing.

If the patient was properly prepared before the operation, and if the surgeon was very careful in executing the technic not to traumatize the soft tissues, and he used a clean surgical procedure, there would be little postoperative treatment necessary, outside the regular routine treatment that should be prescribed in all cases. As injury to the soft tissues always causes inflammation and swelling, it is well to inform the patient that the face may swell, but that this condition will be of short duration if the treatment is carried out as prescribed. Ambulatory patients it is very difficult sometimes to convince of the necessity for carrying out certain postoperative treatment and orders are not always strictly followed. With hospital cases, it is quite different, as the doctor writes out his orders and the nurses usually carry them out to the letter. As the application of cold is more effective in the early stages of inflammation than in the advanced stages, to get the desired result it should be applied immediately after the opera-

tion has been completed, in the form of either cold compress or ice packs. Cold lowers the temperature of the parts and prevents extravasation of the elements of the blood and lymph into the tissues. As the cold compresses are much lighter in weight than an ice pack, they cause less pressure on the parts and are therefore more comfortable to the patient. If applied correctly, they are just as effective. The ice pack should be left on the face for at least fifteen or twenty minutes out of every hour and the treatment continued for at least twenty-four hours. The patient should be put on a liquid or semiliquid diet, this depending on the extent of the operation, and the diet should be alkaline in character.

A mild saline cathartic should be prescribed. The patient should be instructed to irrigate or rinse the mouth gently every three hours with a warm saline solution or a good antiseptic, not beginning until about two hours after the operation. He should be impressed with the fact that he is not to use force in rinsing. It is better to instruct him to hold the warm solution in the mouth for at least two minutes rather than to rinse.

A great many patients are very apprehensive as to the amount of pain they may have after the operation. I always prescribe some remedy to relieve this apprehension. I have found 5 grain doses of amidopyrine, every three hours for the first twenty-four hours following the operation, to be very dependable. Of course, there are numerous other anodynes that are effective. When a dressing has been used, especially when the dressing has been moistened with compound tincture of benzoin, it may be left undisturbed for seventy-two hours, when it may be removed, the wound irrigated with tincture of metaphen and the dressing replaced. If sutures were used, they should be removed in four or five days. If postoperative hemorrhage should occur, it is well to examine the wound carefully for the source of the bleeding. All blod clots should be removed, and the wound should be irrigated with a warm saline solution, dried out as much as possible with small gauze sponges and tightly packed with a piece of sterile gauze that has been moistened with hemostatic serum. If this does not con trol the bleeding, it is possibly due to the rupture of a small vessel in the soft tissue. The bleeding can be stopped by pinching the vessel with a hemostatic clamp, if it is small. If large, it will have to be ligated with catgut. Bleeding in the bone can be stopped, as previously stated, by burnishing the bleeding point with a round burnisher. Although the operator took every precaution toward cleanliness and a careful technic, the blood clot, in some cases, becomes infected and liquefies and the wound becomes very painful. In these cases, the wound should be irrigated with a warm saline solution until all remnants of the infected clot are removed. It is not good practice to do extensive curetting in these cases. If it is deemed advisable to use a curette, it should be employed very gently and only for the purpose of facilitating the removal of the clot or food particles. After the infected clot has been removed, gauze sponges should be placed about the wound to prevent the ingress of saliva. Any solution remaining in the wound is removed with sponges. The wound is then swabbed with a 15 per cent solution of argyrol, tincture of metaphen or a one one thousandth merthiolate solution. A light gauze dressing, saturated with compound tincture of benzoin, is placed in the wound. This treatment is repeated every other day for a week or ten days, when new granulations will begin to form and the pain and soreness will have

disappeared. Procaine powder dusted in the wound before dressing is placed will relieve the pain almost immediately. The patient should be instructed to use an antiseptic mouth wash every three hours. Internal remedies capable of relieving pain should be prescribed.

1135 Maison Blanche.

CLASSIFICATION OF MOTTLED ENAMEL DIAGNOSIS

By H. TRENDLEY DEAN,* D.D.S., Washington, D. C.

DURING the past few years, considerable interest has been evinced in mottled enamel. Its world-wide distribution makes it a problem of more than national interest. In addition to its widespread distribution in the United States,[1] endemic mottled enamel has been reported in England,[2] Italy,[3] North Africa,[4] Argentine,[5] Japan[6] and China[7] and in numerous other places.[8]

Surveys that I have made in areas of varying degrees of severity have clearly demonstrated the need for a method of clinically classifying the degree of involvement. Not only is there a qualitative variation among persons using a common water supply, but there is also a marked quantitative difference in incidence among children in different endemic areas. While it is true that the degree of involvement may vary somewhat among different teeth in the same person, it is felt that each person examined should be classified in a manner that would designate in a general way the degree of involvement as found in that person.

In a number of surveys,[1] I have used the following classification: normal, questionable, very mild, mild, moderate, moderately severe, and severe. Little difficulty is encountered by the general practitioner in the diagnosis of those types of mottled enamel ranging from "mild" to "severe." To the experienced investigator, "very mild" presents separate and distinct characteristics. The classification of "questionable" is often a baffling prob-

*Dental Surgeon, U. S. Public Health Service.

1. Dean, H. T.: Distribution of Mottled Enamel in United States, Pub. Health Rep. 48, No. 25, June 23, 1933, pp. 703-734. Distribution of Mottled Enamel in United States, J.A.D.A., 20:319-33 (Feb.) 1933.

2. Ainsworth, N. J.: Mottled Teeth, Brit. D. J., 55:233-250 (Sept.) 1933; disc. pp. 274-276.

3. Eager, J. M.: Chiaie Teeth (Mottled Enamel), Pub. Health Rep. 16, No. 44 (Pt. 2), Nov. 1, 1901, p. 2576. McKay, F. S.: Mottled Enamel: Report of Examination of Afflicted District in Italy, J. D. Res., 8:353-365 (June) 1928.

4. Velu, H.: Au sujet de l'etiologie et de la pathogenie du Darmous (fluorose spontanee des zones phosphatees), Bul. Soc. Path. Exot., 26:616-622 (Apr. 5) 1933.

5. Chaneles, Juan: Un problema odontológico de interés en la Argentina: La etiologia de Los Dientes Veteados, Rev. Odont. (Buenos Aires), 20:64-73 (Feb.) 1932.

6. Masaki, Tadashi: Geographical Distribution of "Mottled Teeth" in Japan, Shikwa Gakuho, 36 (Oct.) 1931.

7. Anderson, B. G., and Stevenson, P. H.: Occurrence of Mottled Enamel Among Chinese, J. D. Res., 10:233-238 (April) 1930.

8. McKay, F. S.: Present Status of Investigation of Cause, and of Geographical Distribution of Mottled Enamel, Including a Complete Bibliography on Mottled Enamel, J. D. Res., 10:561-568 (Oct.) 1930.

lem. There are areas where the causative factor in mottling of the enamel is apparently just between the maximum harmless amount and the minimum amount capable of producing the milder forms of mottling. In such areas, occasional minute flecks and small white spots on the enamel often show in an unusually high percentage of children.

Slight aberrations in the translucency of normal enamel have been referred to by various dental pathologists. Black[9] states that the smaller white or ashy gray spots which occur on the enamel of teeth, otherwise normal in color and form, are due to the absence of the cementing substance between the rods, which are normal, and that this mild form of dystrophy generally ends in a line following the incremental lines of enamel formation; i.e., the lines of Retzius. He states that these smaller white spots are not infrequently seen in any large school clinic. Later, McKay,[10] in referring to Black's classification of dystrophy, states that white spots, white enamel and mottled enamel are fundamentally the same lesion.

Bunting[11] writes that small white opaque areas in the enamel are distinctly hypoplastic in structure; that the rods may be fairly well formed, but the interprismatic cement substance is absent or deficient, the histologic picture being similar to that of incipient caries. Williams[12] states that white spots may be congenital or acquired and, in both instances, the condition and appearance are similar. In his opinion, the peculiar opaque appearance is due to the absence of cementing substance which causes diffraction of light. He suggests that the acquired spots are the result of the presence of aciduric organisms operating under a bacterial plaque, while in the

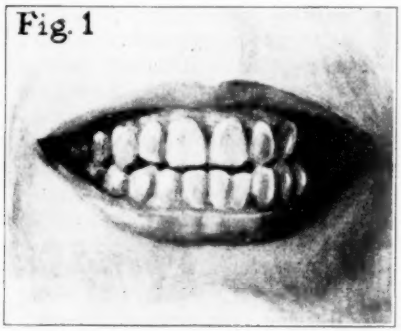


Fig. 1.—Normal condition. The apparent white spots depict "high lights" and are not mottled enamel.

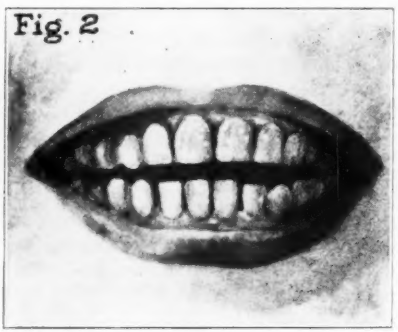


Fig. 2.—Questionable condition.

9. Black, G. V.: Operative Dentistry, Vol. I, Ed. 4, Chicago: Medico-Dental Publishing Co., 1920.

10. McKay, F. S.: Analysis of Conditions Held to Be Accountable for Beginning of Dental Caries (I), D. Cosmos, 71:649-657 (July) 1929.

11. Bunting, R. W.: Text-Book of Oral Pathology for Students and Practitioners of Dentistry, Philadelphia: Lea and Febiger, 1929.

12. Williams, J. L.: Can We, by Change in Food Habits, Change Structure of Formed Enamel to Make It More Resistant to Caries? D. Cosmos, 69:590-602 (June) 1927. Mottled Enamel and Other Studies of Normal and Pathological Conditions of This Tissue, J. D. Res., 5:117-195 (Sept.) 1923.

congenital group he places mottled enamel. Kronfeld[13] refers to the congenital white spots sometimes observed on the labial surfaces of the incisors as indicative of preliminary or abortive stages of hypoplastic enamel, while, with respect to early caries on the smooth surfaces of enamel, clinically known as "white spots" or "brown spots," his inferences are apparently similar to those of Williams and also of Bunting. Kronfeld also notes that such areas of superficial decalcification may develop into true carious defects, or they may remain stationary for a long time, even for a lifetime. Ainsworth,[2] in his recent report on the histopathology of mottled enamel, states that the microscopic appearances are strikingly like those of early decalcification of the enamel from caries. This investigator likewise notes that isolated opaque patches are not infrequently seen in persons whose teeth are otherwise normal and whose habitat has been nonendemic areas. From the foregoing, it is evident that the classification of "questionable" cases, namely, as to whether they are the earliest signs of mottled enamel or of other abnormalities, may present difficulties. The method of utilizing this classification with particular reference to mottled enamel will be described in detail later.

In mottled enamel surveys, I classify each person immediately after the clinical examination. The presence or absence of mottled enamel is noted on the special examination chart in accordance with one of the seven classifications previously referred to, ranging from "normal" to "severe." The basis for each classification is as follows:

NORMAL (FIG. 1)

The enamel presents the usual translucent semivitriform type of structure. The surface is smooth and glossy and usually of a pale creamy white color. In addition to those showing normal calcification, for purposes of classification, there is also included under this heading all persons showing hypoplasia other than mottling of the enamel. Such hypoplasia of the enamel is, in the main, hutchinsonianism and that seen in association with exanthematous disease and nutritional disturbances occurring during the period of the enamel development of the permanent teeth, as described by Bunting.[11]

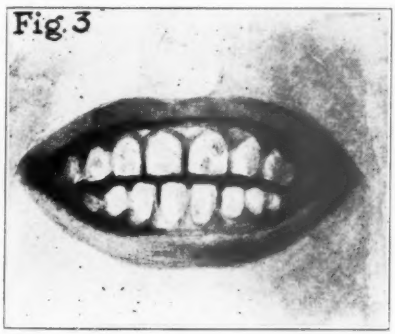


Fig. 3.—Very mild case of mottling.

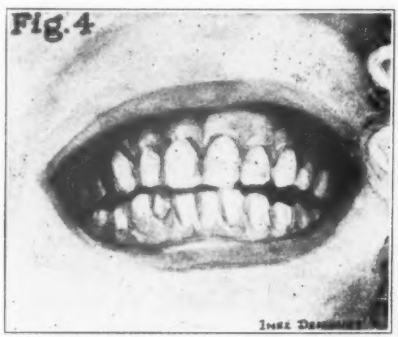


Fig. 4.—Mild mottling.

13. Kronfeld, Rudolf: Histopathology of Teeth and Their Surrounding Structures, Philadelphia: Lea and Febiger, 1933.

If an examination of a person reveals the presence of one of the previously mentioned types of hypoplasia and mottling of the enamel, the examination is recorded solely on the basis of the mottled enamel present and is listed under its proper classification.

QUESTIONABLE (FIG. 2)

In areas of relatively high endemicity (over 75 per cent), there are occasional cases which even the experienced investigator hesitates to classify as either apparently normal or very mild. Such cases are listed as questionable. The common use of this classification occurs in areas where an unusually high percentage of children show slight aberrations in the translucency of normal enamel, ranging from a few white flecks to occasional white spots, 1 to 2 mm. in diameter. In such areas, the following method of differential diagnosis is followed: First, no attempt is made to diagnose these small white spots or minute white fleckings as the earliest signs of mottling of the enamel by examination of the person *per se*. Recourse is always made to group study. For example, a group of twenty-five children whose history shows a continuous use of a common water supply from birth are examined. Another group of equal number and of similar economic or living conditions are selected from a nearby community as a "control." This second group must of course show a history of also using a common water supply exclusively from birth and from a source different from that of the first group. It is of course desirable to have larger numbers in each group, but more can be learned from a small group with the same water supply from birth than from a much larger group wherein different water supplies have been used during the period of calcification of the permanent teeth.

On examination, the first group may, for instance, show fourteen children with apparently normal enamel, eight with occasional white flecks or small white opaque spots on the enamel surface, two with a very mild mottled enamel and one with a mild mottled enamel. The "control" group, on the other hand, yields twenty-two children with apparently normal calcification and three with white flecking or white spots. The eight questionable cases in the first group are naturally suggestive, as three additional children with the same water history, but who were probably more sus-

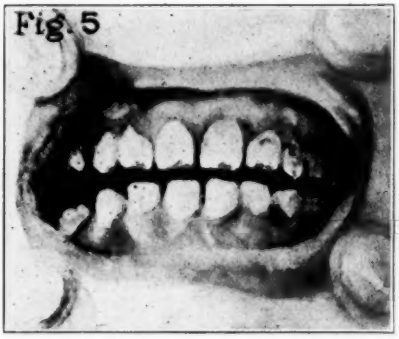


Fig. 5.—Moderate (white opaque) mottling.

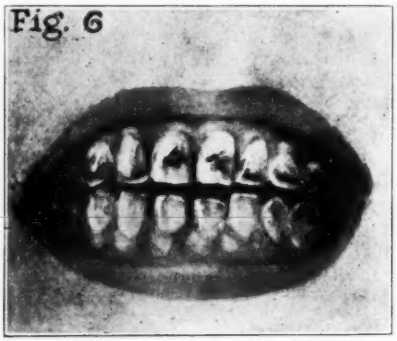


Fig. 6.—Moderate mottling (brown stain).

ceptible than the others, show definite signs of mottled enamel. The few questionable cases in the control group are probably no greater in number than might be expected in an examination of an average school group. Thus, in areas of questionable endemicity, this classification becomes a valuable adjunct. Should an unusually large number of cases be classified as "questionable" when, at the same time, a smaller percentage is likewise showing the milder forms of mottling of the enamel, we are justified in assuming that we are dealing with what is probably a "border-line" area, an area where the causative factor in the mottling is present in the water supply quantitatively somewhere between the maximum harmless amount and the minimum amount capable of producing the very mild and the mild type of mottled enamel in from 40 to 50 per cent of the children who have used the water in question exclusively from birth.

VERY MILD (FIG. 3)

Small opaque paper white areas are scattered irregularly or streaked over the tooth surface It is principally observed on the labial and buccal surfaces, and involves less than 25 per cent of the tooth surfaces of the particular teeth affected. Small pitted white areas are frequently found on the summit of the cusps. No brown stain is present in the mottled enamel of this classification.

In areas of high endemicity, mottled enamel is occasionally observed on the deciduous molars, generally the second deciduous molar. In my experience, mottling of the enamel on deciduous teeth is almost invariably of the very mild type, even though the permanent teeth in the same individual may show a severe mottling.

MILD (FIG. 4)

The white, opaque areas on the surfaces of the teeth involve at least half of the tooth surface. The surfaces of molars, bicuspids, and cuspids subject to attrition show thin white layers worn off and the bluish shades of underlying normal enamel. Faint brown stains are sometimes apparent, generally on the upper incisors.

MODERATE (FIGS. 5-6)

No change is observed in the form of the tooth, but generally all of the tooth surfaces are involved. Surfaces subject to

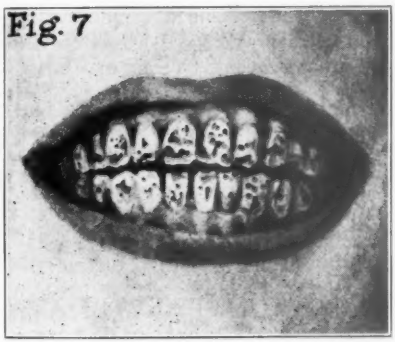


Fig. 7.—Moderately severe mottling, with discrete pitting.

Fig. 8.—Severe mottling, with confluent pitting.

attrition are definitely marked. Minute pitting is often present, generally on the labial and buccal surfaces. Brown stain is frequently a disfiguring complication. It must be remembered that the incidence of brown stain varies greatly in different endemic areas, and many cases of white opaque mottled enamel, without brown stain, are classified as "moderate" and listed in this category.

Fig. 9.—Severe mottling (brown stain).

MODERATELY SEVERE (FIG. 7)

Macroscopically, a greater depth of enamel appears to be involved. A smoky white appearance is often noted. Pitting is more frequent and generally observed on all the tooth surfaces. Brown stain, if present, is generally deeper in hue and involves more of the affected tooth surfaces.

SEVERE (FIGS. 8-9)

The hypoplasia is so marked that the form of the teeth is at times affected, the condition often being manifest in older children as a mild pathologic incisal-occlusal abrasion. The pits are deeper and often confluent. Stains are widespread and range from a chocolate brown to almost black in some cases. Under this classification, I include the type of case which McKay[14] has referred to as the "corrosion" type of mottled enamel.

14. McKay, F. S.: Establishment of Definite Relation Between Enamel That Is Defective in Structure, as Mottled Enamel, and Liability to Decay (II), D. Cosmos, 71:747-755 (Aug.) 1929.

GOLD ALLOYS: AN EVALUATION OF RESEARCH DATA IN RELATION TO CLINICAL REQUIREMENTS*

By STANLEY D. TYLMAN, A.B., D.D.S., M.S., F.A.C.D., Chicago, Ill.

FOR centuries, Art has preceded Science. Having attained a high degree of skill in the restorative phases of dentistry, the dental profession, during the past ten years, has directed its efforts toward further development through a better understanding and application of the basic sciences. The dentist has directed his thoughts toward biology, chemistry and physics in an effort at progress and correlation.

Evidence of the use of gold for dental purposes has been traced to ancient Egyptian and Etruscan periods of history. The prostheses consisted primarily of extracted teeth attached to the remaining

*Read at the Seventy-Fifth Annual Session of the American Dental Association in conjunction with the Chicago Centennial Dental Congress, Aug. 10, 1933.

ones by means of gold wires or bands. Although the ancients had advanced in the science of metallurgy, they used pure gold instead of alloys in their restorations as the prime objective was esthetics and not strength.

It was not until the early part of the last century that dental prostheses were called on to fulfill the function of chewing in addition to esthetics. This necessitated stronger metals and alloys.

Few dentists at the time possessed sufficient knowledge of metals to develop formulas and compound their own alloys. Instead they utilized the alloys found in the gold coin of the country; and by using such metals, they found that they were able to construct appliances which would withstand the additional forces to which they were subjected. With further refinement of technic and design, a definite need arose for gold alloys which could be used in prostheses of less bulk and greater strength. The response to these newer requirements was met by a gradual and ofttimes uncontrolled development of alloys by the manufacturers, who in some instances compounded their formulas by the "hit and miss" method and gave these products to the dental profession for clinical experimentation. Occasionally, there emerged an alloy that was acceptable, but the larger percentage were discarded after their use demonstrated their deficiencies.

It is apparent that in addition to the lack of fundamental metallurgic information, there was no definite desire on the part of the profession to formulate definite standards for the materials which they were using daily. More often than not, they were influenced in the selection of their materials by the sales talk of a detail man or by the fact that clinicians had referred to and recommended certain materials.

Dental golds were generally classified as "strong," "double strength," "easy working," etc. As to exactly what these terms meant the salesmen themselves were hazy.

A little over ten years ago, the first serious effort was made by the manufacturers of dental golds to classify their products according to the uses for which they were intended. An effort was also made to indicate the physical characteristics of the metals in addition to their chemical composition. They were seriously handicapped in that there were no accepted or uniform specifications available; and, consequently, it was difficult, if not impossible, to convey the desired information from the manufacturer to the dentist.

The following description is the sincere effort of a reliable gold manufacturer to describe at that time an inlay gold, and also to give its physical properties:

Alloys for Casting: This alloy consists of pure gold and a small percentage of alloy (Pt. Cu. Ag.) sufficient to modify the behavior of the pure gold in casting but without any perceptible change in color or melting point. The alloying elements increase the hardness slightly; in consequence, inlays of this alloy cannot be distinguished from those made of pure gold, but are much more resistant to flow and abrasion. This alloy is suitable for inlays and other individual tooth restorations in cases where the stress is not great and it is desired to simulate the color of pure gold.[1]

Contrast this with the same manufacturer's description of a similar type of alloy today:

Soft Casting Golds: For inlays or other cast tooth restorations requiring an alloy with a minimum power of resistance to mechanical stress, and the color of gold.

Melting Range Fahr.—1825°-1900°.

Ultimate Tensile Strength—31,300 lbs. per sq. in.

1. Ney-Oro Gold Alloys, Hartford: J. M. Ney Company, 1922, p. 10.

Brinnell Hardness—46.
Proportional Limit—7,800 lbs. per sq. in.
Elongation—25%.
Color—Pure Gold.
Guaranteed to comply with the A.D.A. Specification No. 5 for Dental Inlay Casting Golds (Gold Color) Type A.[2]

It may readily be seen by comparing the foregoing examples that the gap between the manufacturers and the dentist has been bridged by genuine research which has placed the production of gold alloys on a scientific basis permitting the selection of a suitable alloy according to the intended specific purposes.

For years, steel structural engineers have demanded and obtained from the steel manufacturers data pertaining to the mechanical properties, chemical composition and the physical characteristics of the steels which they used. They organized and have had for many years societies for the purpose of developing and standardizing test methods. Without an accepted standard for testing materials, the available data lose much of their value, as the possibility of exchanging information and ideas on a common, comparative basis is limited. These men have determined the various properties of materials and interpreted their significance as related to practical application. In order to permit workers in the field to report their results with an exactness understandable to all, it was necessary to develop and adopt a uniform terminology.

Although the first scientific study of a dental material was made nearly fifteen years ago at the Bureau of Standards,[3] it was only recently[4] that organized dentistry realized the necessity of establishing a permanent organization for the purpose of classifying dental materials, determining their properties and standardizing tests whereby the general practitioner could evaluate the significance of such tests in practical clinical application. So successful and so valuable has been the cooperative research of the National Bureau of Standards and the American Dental Association that it is the hope of dentistry today that the American Dental Association continue to support this laudable work at the Bureau. Credit for the success of the undertaking is due largely to Wilmer Souder, of the Bureau of Standards, who has guided the work since its inception; also the Research Associates of the American Dental Association, George C. Paffenbarger, Mr. W. T. Sweeney, and Mr. Aaron Isaacs. Our apreciation is also expressed to N. O. Taylor and Mr. R. L. Coleman, former Associates at the Bureau.

The value of the accomplishments of this research program may be estimated by the fact that their findings have been reported in nearly fifty papers and reports, in addition to seven specifications for the following dental materials: amalgam,[5] inlay casting investment,[6] impression compound,[7] inlay wax,[8] inlay casting

2. Gold, Hartford; J. M. Ney Company, 1932, p. 6.

3. Bureau of Standards Technologic Paper No. 157.

4. Coleman, R. L.: Bureau of Standards Research Paper No. 32, 1928.

5. Taylor, N. O.: Specification for Dental Amalgam Alloys, J.A.D.A., 17:112-124 (Jan.) 1930.

6. Taylor, N. O.: Paffenbarger, G. C., and Sweeney, W. T.: Dental Inlay Casting Investments: Physical Properties and Specification, J.A.D.A., 17:2266-2286 (Dec.) 1930.

7. Taylor, N. O.: Sweeney, W. T., and Paffenbarger, G. C.: Specification for Dental Impression Compound, J.A.D.A., 18:53-62 (Jan.) 1931.

8. Taylor, N. O.; Paffenbarger, G. C., and Sweeney, W. T.: Specification for Inlay Casting Wax, J.A.D.A., 18:40-52 (Jan.) 1931.

gold,[9] dental mercury[10] and wrought gold wires.[11] At this congress, they are presenting a report on oxyphosphate of zinc cements.[12] The labor of this commission does not cease with the drawing up of specifications, for the various dental materials on the market are checked against the guarantee statements made by the manufacturers who have agreed to comply with the Bureau specifications. Likewise, should it be found advisable to revise or modify the specifications, the committee is ready to do so.

Realizing the necessity of close cooperation with the dental profession, the manufacturers appointed a special committee for the development of physical testing of dental materials and specifications for testing methods.[13] This committee classified dental precious metal products and established a relation of physical properties to structural usefulness. They also determined on a uniform terminology and test methods.

When materials are subjected to physical tests, they not only help to verify or disprove theories, but also establish natural laws which help explain certain observed phenomena. Such tests have furthered the improvement of existing materials and helped in the development of new ones, at the same time determining the relative values and suitability of the various materials.

This committee felt that, in making tests of any character, it was necessary that the test specimens approximate the pieces as actually employed in the mouth, as to both dimensions and conditions of use, if comparative data were to be of much value. Crowell[13] formulated the following principles as necessary if tests were to be of comparative value:

1. Test specimens and methods must conform as nearly as possible to the conditions of actual use, particularly in regard to size of specimen, condition (wrought or cast), heat treatment, method of loading and rate of application of load.

2. Tests must be run in a uniform manner, so accurately described that they can be duplicated both by the same worker and by others.

3. Tests are not comparable unless made by the same method, or unless the extent to which changes in the test methods affect results is known.

4. Tests must be planned so that unavoidable errors are small, giving results that are sufficiently constant to permit duplication and sufficiently accurate to be practically useful.

The committee also classified precious metal dental products as follows: 1. Wrought wires. 2. Wrought plates. 3. Casting golds. 4. Solders. 5. Fabricated articles. They also classified the physical properties into major, minor and deferred types.

Although it is true that the dental profession should determine the practical requirements of dental materials, their development should be left to the research staffs of the manufacturers, subject to the specifications and approval of the Research Commission of the American Dental Association. As a result of the present

9. Taylor, N. O.; Paffenbarger, G. C., and Sweeney, W. T.: Inlay Casting Golds: Physical Properties and Specifications, J.A.D.A., 19: 36 (Jan.) 1932.

10. Isaacs, Aaron: Mercury for Dental Amalgams, J.A.D.A., 19:54 (Jan.) 1932.

11. Paffenbarger, G. C.; Sweeney, W. T., and Isaacs, Aaron: Wrought Gold Wire Alloys: Physical Properties and a Specification, J.A.D.A., 19:2061-2086 (Dec.) 1932.

12. Paffenbarger, G. C.; Sweeney, W. T., and Isaacs, Aaron: Preliminary Report on Zinc Phosphate Cements, J.A.D.A., 20:1960-1982 (Nov.) 1933.

13. Crowell, W. S.: Development of Physical Testing of Dental Materials and Specifications for Testing Methods, J.A.D.A., 19:90-92 (Jan.) 1932.

arrangement, inferior materials are rapidly disappearing from the market, the intelligent and conscientious dentist of today looking to the Bureau for guidance and insisting on using only those materials that conform to A.D.A. specifications. He does this for his own protection as well as for the protection of his patient. Thousands of dollars are saved annually to the dental profession because materials formerly sold on the basis of the personal endorsement of some prominent dentist, and which subsequently had to be discarded, are now appraised on the basis of their physical behavior. Today, there is a substitution of scientific data and known performance for private testimonials and unscrupulous manufacturers' propaganda.

The dentist of today enjoys certain advantages which men twenty-five or even ten years ago did not possess. He has means at his disposal whereby he may, with reasonable certainty, determine whether a material has sufficient strength to withstand distortion or possible failure in use. In designing a prosthesis, he may select a material the workability of which lends itself to his particular technic; or he may select an alloy whose physical properties enable him to reduce the size of the appliance with accompanying comfort to the patient. He even has the choice of color at his command. All these advantages have accrued as a result of an honest effort to correlate laboratory findings with clinical requirements.

Today the study of dental golds is not limited to chemical composition. A more intensive study is being made of the internal structure of the metal with its physical properties. Metallography, or that branch of science which studies the structure of metals through the microscope, is not self-sufficient in furnishing the necessary information concerning metals and their alloys. It is only when physical tests supplement photomicrographs that the full possibilities are attained. More recently, Shell and McCormack[14] have shown the added value of the roentgen rays in making such studies.

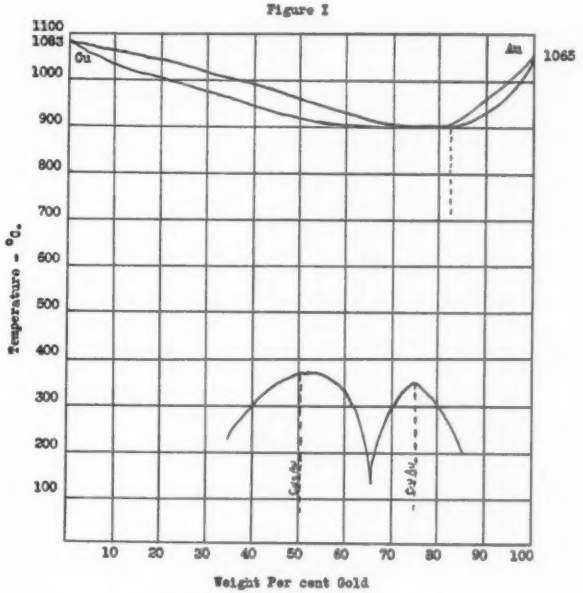
The ability to interpret the physical phenomena of dental golds is contingent to a degree on a knowledge of the structure of pure metals and their alloys. In order to understand the aggregates, it is essential to be familiar with the structure and properties of the constituents.

Pure metals in the solid state are definitely crystalline. It is also known that a crystalline structure is the result of the building up of the atoms in three directions. It has been shown further that the distances between the atoms of a metal are regular. The pattern showing the geometric relation of one atom to another in a crystal is known as the space lattice, and the simplest arrangment is the cube. The most common cubic type is the face centered, which has one atom in each corner and one in the center of each face. The other type is the body centered with one atom at each corner and one in the center of the cube. In addition to these, there is the hexagonal close packed. You may wonder what this has to do with dentistry. The first two are of special interest to us since most of the noble metals belong to the first or face centered type. These metals whose crystals have their space lattices arranged on the face centered cubic type of atomic relationship are known to be very ductile and good conductors of heat and electricity. The many phenomena of the physical metallurgy of the so-called solid metals may be more rapidly comprehended if we visualize these atoms as moving constantly in the crystal space lattices and assuming positions of equilibrium in the solid state.

14. Shell, J. S., and McCormack, Donald: Roentgenographic Examination of Dental Gold Alloys, J.A.D.A., 18:2193 (Nov.) 1931.

The pattern of the crystal, which may be one of six types, does not concern us so much as its structure, particularly its fineness or coarseness. Generally, the finer the grain the stronger the metal. The controlling factors involved in the melt are the casting temperatures of the metal and of the mold; the quench rate of the mold, and the purity in the melting. A hotter metal or mold will give a coarser grain than a metal or mold of a lower temperature.

Figure 1



Gold-Copper Constitution Diagram. (Harder)

The grain size is an important item since some of the present day dental golds may, by improper heat treatment, be rendered useless owing to the resultant excessive hardness and brittleness. The opposite may also be disastrous, as excessive grain growth will produce a metal also lacking proper physical properties. Temperature and time are important controls in relation to grain size. The addition of certain metals, notably platinum and palladium, has been shown to decrease the grain size perceptibly.[15] The smaller the initial grain size of a metal, the greater the hardening effect of any deformation. This is a fact to be taken into account in making adjustments on gold dental appliances. The time may come when the average diameter of the grain size will be included in the specifications for wrought dental golds.

Occasionally, we hear dentists tell a patient that a gold appliance has failed because the gold has crystallized during service, and they "convince" the patient by showing him the crystalline appearance of

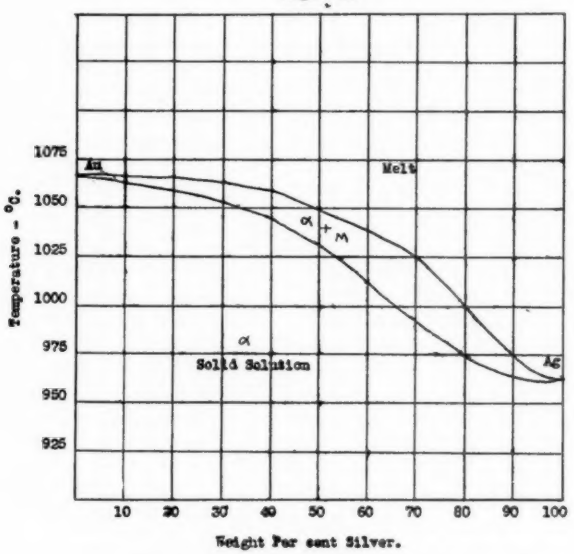
15. Wise, E. M.; Crowell, W. S., and Eash, J. T.: Rôle of Platinum Metals in Dental Alloys, Am. Inst. Min. & Met. Engineers, February, 1932, p. 42.

the two surfaces of the fracture. As previously stated, metals in the solid state are crystalline to start with; hence, this is not *per se* the cause of the failure. It is more probable that the failure occurred because of improper heat treatment, shrinkage porosity or defects in the material. It is improbable that grain size changes in an appliance under mouth conditions of stress and temperature.

The shape of a grain or crystal may be changed by working the metal. When this is done, one series of atoms moves along another series of atoms in the crystal along certain planes called "slip planes." Face centered crystals have many slip planes; hence, their metals have a high elongation. It is believed[16] that this slippage of planes causes a staggering of the normal atomic relations in the crystals and contributes to an increased mechanical hardening of the metal, also an increased electrical resistance due to an interruption of the smooth flow of electrons from atom to atom.

A pure metal, such as gold, having only one phase in the solid state varies only in the size and shape of its grains, the controlling factors having been mentioned previously. The use of pure gold in dentistry is very limited, owing to certain of its characteristics. Its extreme malleability and lack of response to heat treatment precludes its general use in cast or wrought appliances. Being a pure metal, it solidifies at a single, constant temperature; which makes it a rather difficult material to use when definite and sharp castings are required. It has been found that such castings are more susceptible to "shrink spot" porosity because there is no

Figure II



Gold-Silver Constitution Diagram. (Harder)

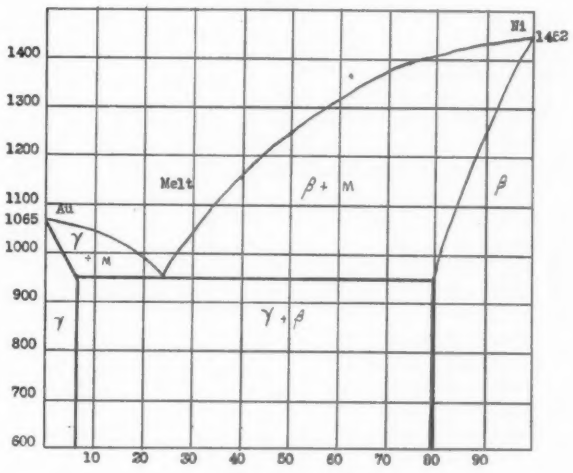
16. Jefferies and Archer: Science of Metals, 1924, p. 250.

freezing range during which additional molten metal may be fed into the mold during solidification, as is possible when certain alloys are used. The low proportional limit and ultimate tensile strength, together with a Brinell number below 50, make pure gold very limited in its application.

There has been a tendency on the part of some dentists to appraise dental golds on the basis of carat or fineness. The Bureau of Standards took into consideration the intrinsic value of dental golds when it drew up its specifications, but it did not overlook the fact that important as the precious metal content of an alloy might be, the ability of such an alloy to resist corrosion in the oral fluids and its suitability, physically and mechanically, for a particular use was more important.

To meet the specific and exact requirements of present day dentistry, it was found necessary to develop alloys of gold which would meet these specifications. It has been determined by Harder[17] that, by using a 10 per cent variation of the forty metals, it is possible to obtain 8,039,460 different alloys. Dental golds contain at least two metals, and sometimes as high as seven or eight, among which are included, in addition to gold, the following: copper, silver, platinum, palladium and nickel. The diversity and complexity of many golds of the past led one to believe that the bases of their formulas were largely empiric, and that their value was largely determined by the market price of the precious metals used. Today, dental gold manufacturers include in their organizations highly trained and qualified research staffs whose duty it is to develop alloys to meet the specific requirements

Figure III



Gold-Nickel Constitution Diagram. (Harder)

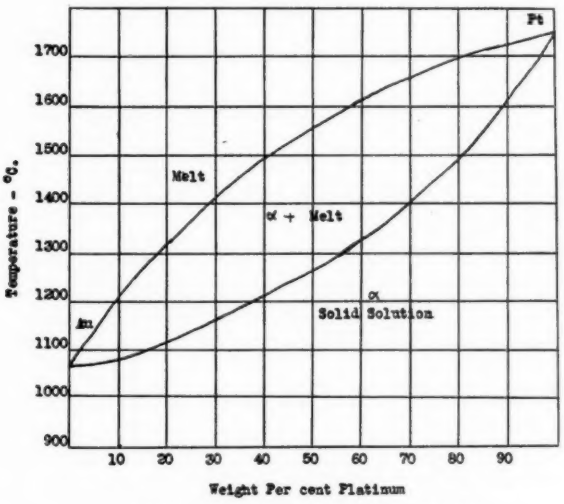
17. Harder, O. E.: Modern Dental Metallography, Minneapolis: Burgess Mimegram Publishing Co., p. 28.

of the profession. Reliable manufacturers are cooperating with the Bureau for the protection of the dentist. The dentist should also cooperate, for his own protection as well as that of his patient.

When two or more metals are brought together, three possible conditions may result, depending on the degree of atomic attraction between the elements. If the degree of attraction between like atoms is greater than that between the unlike, there will be no close union of the two metals. Each element retains its identity, and there will be present two physically distinct phases. Lead and aluminum form such an alloy, if it may be called such.

On the other hand, the attraction between the atoms of unlike metals may be so great that they react in definite atomic proportions to form definite metallic compounds. Copper and aluminum form the compound $CuAl_2$; copper and gold, CuAu and Cu_3Au. They are characterized by the fact that they form one phase, possess a distinct crystalline form, usually quite complex, and, in many of their properties, are different from the constituent metals. Compounds, just as pure metals, have a definite melting temperature, which is usually quite high, and sometimes above that of the individual constituents. They are extremely hard and brittle, but they play an important part in the hardening of dental golds when subjected to heat treatment. Two intermetallic compounds are formed in the copper-gold alloys, namely CuAu and Cu_3Au. The first compound contains approximately 75 per cent of gold by weight, while the second contains only 50 per cent. Consequently, the first is of chief interest to us. Copper-gold alloys are solid solutions in the liquid state as well as in the solid state; but as the temperature begins to drop slightly below 400 C., if sufficient time is allowed,

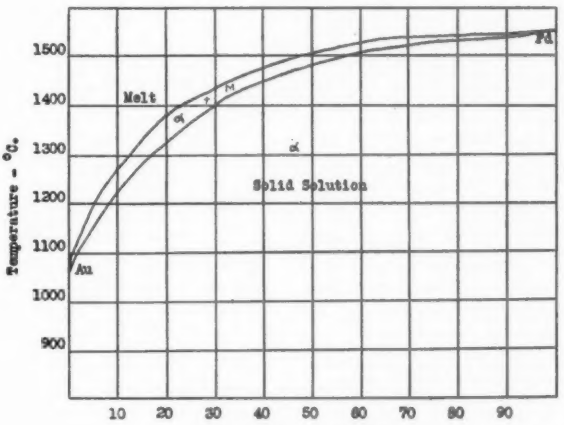
Figure IV



Gold-Platinum Constitution Diagram. (Harder)

the compound CuAu begins to form in those alloys whose gold content is 65-90 per cent by weight. If the alloy is heated and quenched above this temperature, no compound is formed and the alloy remains soft and workable. For many years, the dental profession took advantage of the changes in the physical properties of copper-gold alloys when treated in this manner, but the scientific explanation was developed by Kurnakos, Zemczuzny and Zasedátelev in 1916.[18] More recently, Wise, Crowell and Eash[15] have solutions. In this circumstance, the unlike atoms have a greater affinity than the like atoms, but not of a sufficient degree to form compounds. The constituents of such an alloy are true solutions in both the liquid and the solid states, and the atoms of the constituents are interchangeable in the crystalline structure. The element whose space lattice persists is the solvent; the other, the solute. Solid solutions do not follow any valence laws, but merge in any proportions. They likewise merge their individual properties

Figure V



Gold-Palladium Constitution Diagram. (Harder)

shown that the compound PdCu and PtCu are important in the precipitation hardening of the quaternary dental alloys of the systems Pt-Au-Ag-Cu and Pd-Au-Ag-Cu.

The third possibility which may develop as a result of bringing two or more metals together is the formation of solid so that there is a gradual variance from 100 per cent properties of one to 100 per cent of the other. The gold-cropper and the gold-platinum alloys are solid solutions with the added compounds formed in the lower temperatures. The structure of the solid solution crystal appears homogeneous and has the properties of a pure metal. The addition up to a certain point of a solute to the solvent of a solid solution generally hardens and strengthens the alloy. The maximum hardness

18. Kurnakos, N.; Zemczuzny, S., and Zasedátelev, M.: Transformations in Alloys of Gold with Copper, J. Inst. Metallurgy, 15: 305-332, 1916.

usually occurs where one space lattice changes over to another. It has been suggested that possibly there is an atomic dispersion of the components in solid solutions.[19] When the addition of one metal to another continues to form a solid solution, it has been found that the maximum hardness of the solid solution has been attained when 50 atomic per cent of each metal has been included.

There is one distinct difference between solid solutions and pure metals, compounds and eutectics. The latter group freezes at a constant temperature; whereas, a solid solution freezes or melts throughout a range of temperature. When the percentage of solute is very small, the solid solution may freeze very much like a pure metal; but as the percentage of the solute is increased, a freezing temperature range is established within which solidification takes place. It is this characteristic that makes solid solutions so acceptable for the casting of dental appliances. There is an interval of time during which some of the metal entering the mold starts crystallizing, while additional molten alloy is still available. This, with other means at our disposal, enables us to eliminate shrinkage porosity to a great degree. The first crystals to freeze out are richer in the metal whose addition raises the freezing temperature, leaving a melt richer in the metal which lowers its freezing temperature. After the solution cools slightly, other crystals are formed, but of a slightly different composition from the first. Consequently, when the entire mass is solidified, there is a difference in the composition: it is not homogeneous. Hence, the necessity of proper heat treatment of the alloy to obtain uniform diffusion.

The copper-gold system is one of the important dental alloys. (Fig. 1.) The two metals form a continuous series of solid solutions above 400 C. Below this temperature, the compounds CuAu and Cu_3Au also form. The solid solutions crystallize with the face centered cubic arrangement of atoms. At approximately 75 per cent by weight of gold and a temperature of 885 C., the solution passes through a point where the liquid and solid lines meet. Otherwise, the usual temperature range prevails. To become workable, an alloy should be heated and quenched above 450 C. If a hard alloy is desired, heat treating at slightly above 300 C. is necessary, resulting in the formation of compounds. Alloys containing less than 75 per cent by weight of gold are not indicated for use in the mouth.

Gold and silver also form a continuous solid solution, but its use is very limited in dentistry. (Fig. 3.) It is more effective when platinum is one of the constituents of the alloy.

The prime purpose in using nickel lies in its hardening property. Although it dissolves in gold up to 6 per cent, its use in dental alloys rarely exceeds 1 to 2 per cent. (Fig. 3.) The advisability of the use of nickel in dental golds has been questioned, although its hardening qualities are excellent and its modulus of elasticity high. Tammann states that nickel and copper, at ordinary temperatures, form two series of solid solutions,[20] one arranged in the space lattice of copper and the other in the space lattice of nickel.

Next, if not equal in its importance to the copper-gold system, are the platinum-gold (Fig. 4) and the palladium-gold (Fig. 5) systems, particularly when found with the copper and the silver systems in the quaternary alloys. Extensive research by Wise, Crowell and Eash[15] has

19. Footnote 16, p. 407.

20. Tammann, G.: Metallography, 1925, p. 264.

shown that marked improvement in dental alloys is possible by further additions of these metals to dental golds. Although the platinum-gold system was generally regarded as a continuous solid solution both in the liquid and solid conditions, it is the belief of some authorities[15] that at temperatures slightly below the freezing or solidus line, certain changes occur. It is their belief that the solid consists of a gold part saturated with platinum and of a platinum part saturated with gold. It is further supposed that at a temperature below 650 C., these two solid solutions react and form the compound AuPt. This remains to be proved by further research.

The addition of platinum results in increased hardness in the yellow golds and gives strengths in excess of 150,000 pounds per square inch when added to the gold-copper-silver-palladium alloys. The addition of platinum increases resistance to corrosion and tends to lighten the color.

Palladium forms solid solutions with gold, silver and copper, and its addition to an alloy raises its melting temperature, hardens it and lightens the color perceptibly. Apparently, there are no further changes in the solid condition of the gold or silver systems, but, in the copper system, the compounds PdCu and $PdCu_3$ form at temperatures below 700 C. in alloys up to 50 atomic per cent of palladium. It has been determined[19] that the use of 25 atomic per cent of palladium results in a higher temperature, harder metal and a lighter color than when an equal amount of platinum is used. Alloys of the platinum group make possible dental golds of high melting range, extreme hardness and an elongation of at least 10 per cent.

Every dentist should be qualified to select the proper gold for his restorations. To do this, he must be able to decide what demands will be made on the prosthesis under service conditions and, secondly, determine what materials possess the necessary properties to fulfil the requirements. Today, it is not necessary to compromise the type or design of a dental structure because of inferior materials or uncertainty as to their physical properties. Manufacturers now specify the precious metal content and the quantitative behavior of the metal under stress. In fact, were it possible for a dentist to ascertain the exact time, amount and location of the various strains to which an appliance would be subjected, he would be able to select materials and so design the structure as to meet requirements to a nicety. Physical properties of the materials could be developed to a degree of maximum service with a minimum of bulk. The art of restorative dentistry could more nearly be made an exact science.

Although we do not yet possess sufficient detailed biophysical data to make such an analysis of oral conditions, most practitioners are able to judge in a general way whether the appliance will be subjected to great stresses. If, therefore, he understands the properties of available alloys, he is in a position to select intelligently the one which will meet the demands to be made on it during construction and subsequent service in the mouth. Possessing a fundamental knowledge of physical properties also enables the dentist to make a comparative selection of alloys of different manufacture.

To assist the dentist in his selection, the Bureau of Standards, in cooperation with the manufacturers, has classified inlay casting golds into three general types, A for the soft, B for the medium and C for the hard. In the A group are included those alloys having a minimum precious metal content of 83 per cent and a Brinell hardness number of 40-75, but with a

very low yield point and a high elongation. Group B has a precious metal content of at least 78 per cent, a Brinell hardness number of 70-100, a yield point minimum of 22,000 pounds per square inch and an elongation of 12 per cent. Group C contains metals of 78 per cent precious metal content, a Brinell hardness number of 90-140, a yield point of 27,000 pounds per square inch and an elongation of 12 per cent. Each group is characterized by certain properties. The first is very soft and ductile, permitting a great deal of burnishing; but it has the disadvantage of being difficult to cast, and has a tendency to flow and deform under stress.

The second group is harder, but with a reduced elongation; which makes this type suitable for small castings where the stresses will be moderate and the bulk of material sufficient for strength.

The last group has a high Brinell hardness number, indicating extreme hardness, and a high tensile strength and proportional limit. These golds are indicated for thin bridge retainers which will be subjected to extreme stresses.

Some manufacturers have developed wrought alloys with a Brinell hardness number of from 300 to 400 and a tensile strength in excess of 150,000 pounds per square inch. The tensile properties of a dental gold usually determined are ultimate tensile strength, proportional limit and percentage of elongation. Ultimate strength indicates the load at which the alloy breaks and is usually expressed in pounds per square inch. It indicates the amount of resistance that a metal will offer before it ruptures. When the percentage of elongation is taken into account, with ultimate strength, we have an index of the possible amount of cold work which can be tolerated by a structure. It is sometimes said that dental appliances are not subjected to direct tension in the mouth. While this may be true, it cannot be denied that every time a piece of metal is adjusted by bending, a part of the structure is subjected to a stretching force or tension. Similarly, we find that when forces are exerted on a bridge, one surface may be under compression, but the other is under tension.

The determination of only the ultimate tensile strength, without a knowledge of the proportional limit and the percentage of elongation of a metal, would give us only a limited insight into its properties. Proportional limit is the point in the stretch of a metal where the increase in length ceases to be proportional to the increase in load; while elongation shows, in percentage of the original gage length, the increase in length after the specimen breaks. The proportional limit of a metal indicates the point at which the initial permanent deformation takes place. It also indicates the resistance of a metal to any permanent deformation such as occurs when clasps or wires are bent. High proportional limits should be found in metals used for clasps, thin bridge retainers, bars or connectors and other parts which will be subjected to extreme stresses. Fortunately, most metals having a high proportional limit also have a high ultimate strength. A low proportional limit metal is sometimes indicated in a casting which is to be burnished, but even then an effort should be made to obtain the highest ultimate tensile strength possible.

Elongation is an index of the amount that a metal can be bent, swaged, burnished or otherwise permanently deformed before breaking. Alloys with an elongation of less than 1 per cent are extremely brittle and of little dental use. The working range for casting golds extends from 18 per cent for the soft to 8 per cent for the hard golds. Alloys having high elongation are usually soft. In

selecting a material for clasps which will call for adjustments it is well to select one having considerable elongation.

Percentage of elongation plus ultimate tensile strength indicates the toughness or brittleness of a material; that is, high elongation with high ultimate strength gives a tough metal. A high ultimate strength with low elongation gives a brittle metal, while high elongation with low ultimate strength gives a very soft metal. It can be seen that materials covering a wide range of hardness and other properties for required services are at our disposal.

The mechanical properties of many dental alloys can be greatly modified by proper heat treatment. The steel industry has developed this phase to a high degree. The effect on steel is the opposite of that on dental golds. Quenching from a high temperature hardens steel, but it softens golds; slow cooling softens steel, while it hardens most gold alloys.

In order to soften a gold alloy which has been hardened as a result either of working or previous heat treatment, it has generally been agreed that the structure be heated to 700 C. or 1290 F. and quenched. When an alloy is so treated, we get a high degree of elongation, a low tensile strength, a low degree of hardness and a low elastic limit. As a result, a soft and weak metal is obtained. When an appliance is in this condition, it may be adapted, swaged, bent and worked to degree without danger of fracture. It is not advisable to exceed a temperature of 800 C. or 1470 F. or to go below 300 C. or 570 F.

Through the employment of a suitable tempering process, the appliance may possess high tensile strength, medium elongation, a high elastic limit and a high Brinell hardness number. This gives an alloy that is hard and tough. There are several methods of heat treating alloys. By improper heat treatment, it is possible to get a very brittle and useless structure. Such a condition results with a very high ultimate tensile strength, a high hardness and an elongation of less than 1 per cent. This condition may result when a large casting is cooled slowly in the investment. Such cases should, after a lapse of ten minutes, be plunged in water.

According to the hardening treatment developed at the Bureau and generally suggested, the structure is heated after quenching, to a temperature of 450 C. or 840 F., and gradually cooled within thirty minutes to 250 C. or 480 F. This is usually done in an oven whose temperature and time may be controlled. It has been found that if an alloy subjected to this method of hardening develops the desired properties, the same effects may be obtained by age hardening; in which case, the structure is submitted to a definite temperature for a definite period of minutes for specific alloys, after which it is removed and immediately cooled at room temperature. Some gold manufacturers have already determined age hardening data for specific alloys. This can be done either in an air oven or in a liquid whose temperature can be held at constant temperatures. Many investigators[15] prefer and recommend the method of aging at fixed temperatures.

The advantages of heat treatment are that by developing the desirable qualities to a maximum, it is possible to construct appliances of minimum bulk and greater comfort and service, and at less cost.

In addition to the chemical changes taking place within solid metals, resulting in formation of compounds, we find that, by proper heat treatment, we can also modify the homogeneity of metals. Solid solutions are seldom homogeneous when cast but are made so through diffusion when properly heat treated.[21]

21. Asher, H. H., and Comstock, J. A.: J. D. Res., 13:407 (Oct.) 1933.

Many failures are the result of improper heat treatment, whether intentional or accidental. To avoid difficulties, it is advisable to adopt a standard method, preferably the one recommended by the manufacturer.

The porosity of metals may be divided into two general classes: The first is due to local contraction of the metal on cooling; the second is caused by impurities and occluded gases. We find that the first condition is more generally found near the sprues. This can be eliminated to a great degree by the proper placement of reservoirs which will supply molten metal to the casting as it shrinks during solidification. The second condition may also be controlled if care is observed to use the proper alloys and proper flux and the metal is properly melted. The linear casting shrinkage is a constant factor and cannot be modified to any great extent. The figure 1.25 per cent is the generally accepted value.[4] Unlimited credit is due the Bureau and its associates for their excellent research on this problem, which resulted in the placing of dental casting on a scientific basis.[22] Methods have been developed to compensate for this shrinkage.

There are numerous other questions confronting the dental practitioner today in the use of gold alloys. A continued, cooperative effort by the dental profession, the Bureau of Standards and the manufacturers will assist in the recognition and the solution of many other problems in the use of gold alloys. The selection and application of soft or hard gold alloys to dental restorations is definitely determined according to mechanical and physical properties, but not in accordance with specific biologic requirements. The latter may be disclosed to us by further research.

22. Paffenbarger, G. C., and Sweeney, W. T.: J. D. Res., 5:681 (Oct.) 1931.

DEDICATION OF WELLS AND MORTON TABLETS

By P. G. PUTERBAUGH, D.D.S., Chicago, Ill.

IT is very appropriate indeed on this occasion in the Century of Progress Exposition that dentistry should be accorded the privilege of publicly honoring two of its members who have rendered invaluable contributions to humanity. It is difficult to realize that less than ninety years ago, the first system of abolishing pain was given to the world. I wonder how many people today know that both of the discoverers of the anesthetic properties of nitrous oxide and of ether were practicing dentists.

We were all impressed by Mr. Dawes' statement that for 300,000 years mankind has been content to direct its energies to the arduous task of eking out an existence on the bare necessities of life; that nearly all of the modern conveniences which we now regard as necessities have been developed within the last century. I need not remind you of the meager comforts of our immediate forefathers as compared to those which we enjoy; but I would remind you of the hundreds of thousands of that earlier period that

*Read at the Seventy-Fifth Annual Session of the American Dental Association in conjunction with the Chicago Centennial Dental Congress, Aug. 11, 1933.

succumbed to disease and accidents who could today, under the influence of anesthesia, be restored to health and happiness. The surgery of a century ago was very limited in its scope, because without anesthesia so many patients died from shock that surgical treatment was undertaken only as a final heroic measure when all else had failed.

Since Horace Wells conceived the idea of performing surgical operations while patients slept, under the influence of nitrous oxide, the study of anesthetics and the refinement of their administration have paved the way for present-day surgical methods. For the first time in the world's history, it became possible to waft the patient quickly and pleasantly into unconsciousness by a few inhalations of an anesthetic; to place him in a condition in which he was entirely oblivious to all external impressions; during which time the most delicate surgical manipulations could be executed with exactness and precision. What a blessing to humanity!

While tonight we are honoring these two men, it is not my intention to convey the impression that they alone have contributed to this important field; for many others in that period and since then have added to its development. There is no doubt that Crawford W. Long, of Georgia, administered ether as a surgical anesthetic in 1842; or that Charles T. Jackson, of Boston, assisted Dr. Wells in manufacturing nitrous oxide and also suggested the use of ether to Dr. Morton.

Be that as it may, had it not been for the labors of Wells and Morton, the blessings of anesthesia might for many years have remained unknown. No one today can challenge the statement that to Horace Wells, of Hartford, Conn., belongs the honor of first intentionally producing surgical anesthesia by means of nitrous oxide; and of attempting to establish, by a public demonstration, that system of inducing insensibility to pain.

To William T. G. Morton, of Boston, belongs the credit of being the first to introduce ether anesthesia and to make known the possibility of maintaining con-

HORACE WELLS
Dentist
1815 - 1848
Benefactor of Mankind
First to Demonstrate the
Usefulness of Nitrous Oxide Gas
and Employ it for
Dental and Surgical Operations,
December 11, 1844
While attending a public lecture
on "laughing gas," Dr. Wells
conceived the idea of using it
for surgical anesthesia and
the next day he gave a
demonstration by having one
of his own teeth painlessly
extracted under its influence.

WILLIAM T. G. MORTON
Dentist
1819 - 1868
First to Demonstrate Publicly
the Usefulness of Ether
as a Surgical Anesthetic,
October 16, 1846.
Already a practicing dentist,
Dr. Morton began experimenting
with ether, in 1844, while a student
at Harvard Medical School.
He made successful trials with
animals and, after taking the
ether himself, gave a public
demonstration at the
Massachusetts General Hospital.
The value of ether for
the relief of pain in
surgical and dental operations
was thus definitely established.

tinuous anesthesia during surgical operations. And so it is with no mean degree of pride that we, in conjunction with the largest assemblage of dentists ever held, do honor to the two distinguished members of the dental profession who gave to the world the most beneficent gift that has ever been bestowed on humanity—the art of anesthesia.

These two tablets which it is my privilege to present bear the inscriptions shown herewith.

In full appreciation of the invaluable service which these two confrères have rendered toward the alleviation of suffering and the prolongation of human life, these tablets are respectfully dedicated.

MEDULLARY AND SUBPERIOSTEAL OSTEOGENIC SARCOMA OF THE MANDIBLE, WITH REPORT OF A CASE

By CHARLES B. GALT, D.D.S.,* San Francisco, Calif.

ACCORDING to Waldron,[1] osteogenic sarcoma rarely affects the skull, and affects the jaws even less frequently, the latter probably in less than 1 per cent of the sarcomas of the skull. Ruppe[2] concurs in the extreme rarity of osteogenic sarcoma of the jaw. Among 1,000 bone tumors, Christensen[3] found only five osteogenic sarcomas of the jaw. Bloodgood[4] stated that he had seventeen cases of periosteal sarcoma of the jaw, one chondrosarcoma and no cases of Ewing's endothelial myeloma or osteogenic sarcoma, either central or periosteal. In a later paper,[5] he gives a preliminary report on an "osteogenic sarcoma of the chondrosarcoma type." Over a period of twenty years, Risak[6] collected thirty-one cases of sarcoma of the jaws in the Surgical Clinic of Vienna. Fourteen of these originated in the mandible. Histologically, one of the thirty-one cases was classed as osteosarcoma and three were classed as osteochondrosarcoma. Among 100 malignant tumors in the jaws, Ochsner[7] found sixteen sarcomas, of which four originated in the mandible. The cases of Pickerill,[8] Hew-

*Assistant Dental Surgeon, United States Public Health Service.

1. Waldron, C. W.: Oral Pathology (edited by R. W. Bunting), Philadelphia: Lea and Febiger, 1929, pp. 440-445.

2. Ruppe, C.: Malignant Tumors, Rev. Odontologie, 52:685-710, 1931.

3. Christensen, in Ewing James: Neoplastic Diseases, Ed. 3, Philadelphia: W. B. Saunders Co., 1928, 289.

4. Bloodgood, J. C.: Practice of Surgery (edited by Dean Lewis), Hagerstown, Md.: Prior and Co., Vol. 4, Sec. II, pp. 118 and 220.

5. Bloodgood, J. C.: Problem of Pain in Tooth or Spot in Jaw, of Loose Tooth or Teeth, Abscess or Swelling of Lower Jaw, J.A.D.A., 19:1573-1574 (Sept.) 1932.

6. Risak, E.: Zur Klinik und Statistik der bosartigen Kiefergeschwuelste, Arch. f. klin. Chir., 147:162-175, 1927.

7. Ochsner, A. J., Clinical Observations Concerning Malignant Tumors of Jaws, Ann. Surg., 68:136-140 (Aug.) 1918.

8. Pickerill, P.: Four Interesting Tumors, M. J. Australia, 2:591-594 (Nov. 10) 1928.

son[9] and James[10] reported as osteogenic sarcoma of the mandible were apparently not osteoplastic. Whitall[11] reported his case simply as "osteosarcoma," without further details. A number of other references to sarcoma of the mandible were found in the literature, but the originals were not available. The classification used in this article is that of Ewing,[12] which is virtually that of the Bone Tumor Registry of the American College of Surgeons.

With reference to local recurrence and distant metastases of mandibular sarcoma, Waldron[1] states: "Local recurrences after operation are more frequent

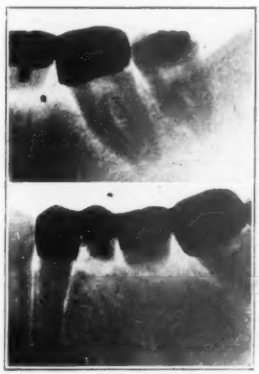


Fig. 1.—Above: Lower right second and third molars. Below: Lower right second bicuspid to second molar. (Jan. 13, 1932.)

than metastases to the lungs or other distant parts. The technical difficulty of removing a portion of the jaw affected by such a tumor, which is usually not well limited, probably accounts for local recurrences."

9. Hewson, A.: Osteosarcoma of Mandible, Ann. Surg., 49:614-617, 1909.

10. James, C. W.: Osteosarcoma of Mandible, Pacific D. Gaz., 22:455-459 (June) 1914.

11. Whitall, J. D.: Sarcoma of Inferior Maxilla, New York M. J., 90:378-380, 1912.

12. Ewing, James: Neoplastic Diseases, Ed. 3, Philadelphia: W. B. Saunders Co., 1928, pp. 288-312.

CASE REPORT

History.—A seaman, white, aged 29, was admitted to the U. S. Marine Hospital in San Francisco, Jan. 12, 1932, complaining of a swelling of the right lower jaw of two weeks' duration. Chills, fever and weakness appeared a few days later.

Examination.—Examination revealed a satisfactory state of oral hygiene and dental restorations. The lower right second bicuspid and first molar had been replaced by a bridge, the first bicuspid and second molar being used as abutments. About three and one half years previously, the patient had had one of the missing teeth extracted, with some hemorrhage, and, about a year later, a dentist supposedly removed a root of that tooth and the other tooth in question. About a year and a half prior to admission, the bridge had been placed.

Fig. 2.—Resected portion of mandible, Feb. 8, 1932.

Fig. 3.—Resected portion of mandible, Feb. 8, 1932.

There was a large, hard swelling which occupied the entire space beneath the pontics of the bridge and extended buccally about 1 cm. and lingually 0.5 cm. It extended anteriorly along the buccal side of the first bicuspid and posteriorly along the second molar; and was hard, firm and not tender to pressure, except slightly where the growth was pressing on the inferior surfaces of the pontics. This swelling was covered with normal mucous membrane, except at the points where it touched the pontics, and here it was becoming blanched.

The Wassermann reaction was negative; red blood count, 4,876,000; differential count: small mononuclears, 40, neutrophils, 59, eosinphils, 1. The white blood count was 8,400. Hemoglobin was 90 per cent. Throat smears showed a non-hemolytic streptococcus. The urine was negative.

Fig. 4.—Appearance of patient, Dec. 12, 1932.

Roentgenograms disclosed an area around the mesial root of the lower right first molar that was thought to be an osteitis. The clinical picture was not one of an acute osteomyeletis or osteitis. A neoplasm was suspected and a specimen was obtained for biopsy. The biopsy report from the hospital laboratory was "caries of the bone." Thorough curettement of the area and extraction of the root was therefore decided on.

Operation.—January 19, this operation was performed under a local anesthetic. The second molar was found to be so loose that it was extracted in removing the bridge. The tissue over this area was laid back, a thin layer of granulation tissue being exposed. Beneath was a large amount of spongy bone. A specimen was sent to the hospital laboratory for examination, and the report was the same as on the biopsy specimen. This spongy bone and the root were removed, a deep concavity being left in the center of the mandible, surrounded by a definite widening of the bone on both buccal and lingual sides. This material on the buccal side "shelled off" in large pieces and with great ease. It was of an entirely different appearance from that which had been previously obtained, being poorly calcified and somewhat striated, with striations appearing to be laid down at right angles to the body of the mandible. One portion of this, examined by C. E. Fitzsimmons, was reported to be malignant. Another was forwarded to the National Institute of Health, Washington, D. C. The remainder of the growth was left until further confirmation of the diagnosis could be obtained. The wound was irrigated with physiologic sodium chloride solution and closed with gut sutures.

Fig. 5.—Appearance of patient, April 26, 1933.

Histopathologic Report.—The histopathologic report on the above-described specimen, as made by R. D. Lillie at the National Institute of Health in Washington, D. C., was as follows:

The tumor is composed of irregularly interspersed areas of partly calcified cancellous bone with large osteocytes, areas of osteoid tissue, areas of immature, quite cellular cartilage, areas of areolar tissue, and areas of densely packed large round and spindle cells with round or oval leptochromatic nuclei, moderately prominent nucleoli, especially in the large round cells, and moderately numerous mitoses. This is an osteogenic osteoplastic subperiosteal sarcoma of type described in Ewing's Neoplastic Diseases, Third Edition, pp. 291-292, in which malignancy appears to be of moderately high grade.

Postoperative Treatment.—A consultation was held and it was deemed advisable to give the patient roentgen-ray and radium emanations before resecting the mandible, even though the benefits of this treatment were highly problematic. February 3, 4, 5, and 6, the patient received radium 225 mg.-hrs. and roentgen rays 900 R. The roentgenographic reports indicated no malignancy in the chest, but considerable hilus and peribronchial thickening, and no evidence of parenchymatous disease.

Second Operation.—February 8, the patient was operated on by Leo Eloesser. Under local anesthesia, Kocher's incision was made through the median line of the lip down through the chin to the level of the hyoid. Skin and soft parts were separated from the tumor with the coagulating electrocautery. The submaxillary and a number of adjacent lymph glands were removed with the contents of the right submaxillary triangle. The facial artery was ligated and a portion of the mandible from the left lateral incisor to the angle of the mandible on the right side was removed. March 4, the roentgenographic report was "no evidence of malignant invasion of remaining portion of mandible or other facial bones."

Outcome.—Subsequently, the tumor recurred locally, broke down and drained. The usual cachexia occurred, and, May 2, about fifteen months after resection of the jaw, the patient died. (The normal weight of the patient was from 160 to 165 pounds. February 15, 1932, he weighed 143 pounds; and by April 28, 1933, the weight had dropped to 94 pounds.)

Necropsy.—Following is an abstract of the necropsy report made by C. E. Fitzsimmons, pathologist:

Osteosarcoma of right side of mandible; growth by extension involves the upper remains of ramus of right side, right malar, petrous portion right temporal, right sphenoid, right superior maxilla and the left side of the mandible, the last being the only bone on the left side of the face that was involved.

There was massive necrosis showing all stages of degeneration in all bones of the right side of the face. The tumor mass on the left side was solid and showed no necrosis. This was 8 cm. in length and 6 and 10 cm. in width, and of the usual osteosarcomatous structure.

There was metastasis to the base of the right lung, showing multiple small nodules ranging from 10 by 12 to 14 by 18 mm.

U. S. Marine Hospital.

CLEFT PALATE AND CLEFT LIP*

By WILLIAM LETE SHEARER, A.B., M.D., D.D.S., F.A.C.S., F.A.C.D., Omaha, Nebr.

MUCH as has been written on the subject of cleft palate and cleft lip, it is evident from the great number of surgical and functional failures that much more must be written and greater study given by those who would undertake to correct this deformity.

Congenital cleft of the palate accompanied by cleft of the lip, either single or double, is without doubt the most conspicuous deformity known to us. To say that it is distressing and a calamity to the parents does not describe this condition. It is a source of grief, not only to them, but also to the unfortunate child all through life, so much so that he will shun society. As a result, his inability to earn a livelihood is greatly lessened, and he, or she, becomes more or less a burden to society, friends or family.

Men cannot successfully treat this deformity with an ordinary training. Training for its successful handling is a matter of years under men who are known to be successful in this type of work. The unfortunate child with cleft palate and cleft lip is entitled to this consideration.

Cleft of the palate is the result of failure of union during the development in embryo of the parts which make up the palate. At the time of birth, the child with a cleft palate possesses the normal amount of tissue to form a perfect palate (with rare exceptions), although it is not united. It is true that later in life, owing to insufficient use of the musculature of the palate, more or less atrophy results. It is likewise true that any other part of the body when not used does not develop.

This one truth alone should be sufficient to commend early surgical intervention as regards the bones as well as comparatively early surgical treatment of the soft palate, as advised by Brophy.

EMBRYOLOGY AND HISTOLOGY

There are six centers of ossification in the formation of the palate, two maxillary, two premaxillary and two palatal; and associated with the bone centers are the soft tissues, mucous membrane, connective tissue, periosteum, etc., which go to form a normal palate. When interference occurs and only then does a cleft of the palate, which is often associated with cleft of the lip, result.

All infants have cleft palate prior to the second month of gestation. Near the end of the eighth or ninth week in embryo, the palatal processes should be perfectly united.

PREDISPOSING CONDITIONS

There has been much written about the causes of cleft palate; yet the most that can be said is that they are doubtless conjectural. This deformity, like all other teratologic phenomena, is subject to further investigation. Different authors have attributed as causes prenatal impressions, uterine inflammation, venereal disease, pressure, defective nutrition during

*Read at the fifteenth annual meeting of the American Society of Oral Surgeons and Exodontists, Chicago, Ill., Aug. 4, 1933.

early weeks of gestation, conditions of heredity and the presence of the intervening mucosa in tooth enamel formation. The one standing out most convincingly is heredity. Prenatal impressions have been suggested by some writers as an etiologic factor. They may be a factor in failure of union, yet there has been no evidence of value given to suggest this. No doubt, faulty metabolism may play an important rôle in a few instances. It is my belief that the child may be generally a weakling and yet be normal as to formation of parts. It has been stated by Professor Warnekros that the presence of supernumerary teeth is a cause. The late C. F. W. Bödecker attributed the condition to an intervening mucosa in tooth formation. The mucosa, during formation of the teeth, dips down into the submucous tissue and forms the epithelial lamina, which later contracts into the epithelial cord at the distal end of which the enamel organ is formed, an obstruction thus resulting.

Brophy once said, "It seems that Bödecker's conclusion that this epithelial cord delays union of the parts forming the maxillae, and the force exerted by the tongue and mandible from the beginning of the third month until birth and several months later, would account for the broad separation of the maxillary bones and the creation of the cleft."

Uterine inflammation and venereal disease no doubt are the cause of many physical defects. Such an inflammation may affect the development as it does many other parts of the body.

Charles Mayo has said:

There is a great principle involved in the causation of birth deformities, and it is one which should explain various types of deformities. As one observes birth defects or anomalies, it is apparent that many of them are normal conditions in some lower type of life, e.g., harelip, cleft palate, fissure defects, etc. Anomalies in circulation, multiple ureters, location of organs and defects due to changes in the evolution of the invertebrate to the vertebrate, which largely affect the nervous system, acephalus, hydrocephalus, spina bifida, club foot and post-anal dermoids.

Experimentally, changes in the salts in

Fig. 1.—Left, extensive unilateral cleft of hard and soft palate, measuring one inch. Not a single tooth bud was lost in the operation. Right, result of second stage operation: namely, correction of lip and nostril. The lip was further corrected later.

which the eggs of several of the lower forms of life are developed lead to a certain percentage of anomalies. This is undoubtedly the reason why a high type of fish like the salmon, probably in an evolutionary state, leaves salt water to lay eggs in fresh water. Anomalies in the human embryo occur in variation of fluid, especially excessive quantity of hydramnion. It is most probable that the cause of embryonic deformities is changes in the salts of the amniotic fluid in which the egg is developed, just as it has been proved to be in the lower types of life.

Observation made by O. A. Strauss in the study of abnormalities of animals in the zoological gardens at Berlin, October, 1913, are particularly interesting. Thirty-two jaguars, born of one mother by the same sire within one year, had cleft palate, and all died. The parent animals were fed cold meat from which the blood had been allowed to escape. Later, the diet was changed and they were fed meat which was still warm and which contained blood, and on this diet not a single cleft palate occurred out of two litters in one year (about twenty-five jaguars).[1]

On the other hand, Mall's investigation on the collection of monsters at Johns Hopkins is at least suggestive that the primary factor is located in the embryo.

In my experience, when it is possible to obtain a good history of a family, there is nearly always a record of cleft palate. On the other hand, as parents are reluctant to give their true history, it is often difficult to study the heredity.

As a general thing, nature does not fail to provide sufficient tissue to form a normal child with a normal palate, but often fails to bring the parts in apposition so that union will result. We are consequently dealing with a true arrest of development. We are therefore inclined to conclude that whether because of inflammation of the female pelvic adnexa, or a more subtle condition, the early nutrition of the embryo is interfered with, a

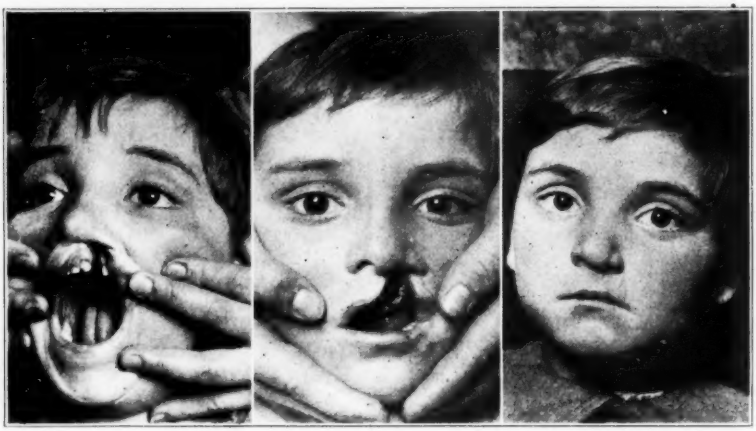


Fig. 2.—Left, cleft of bones in a boy, aged 5. Center, condition after employment of green stick fracture technic to close cleft and bringing of nose into median line of face. Right, appearance of patient after correction of cleft of lip.

1. Brophy, T. W.: Oral Surgery, Philadelphia: P. Blakiston's Son and Co., 1915, pp. 237-242.

disharmony of the growth energies resulting.

EXCITING CAUSES

The tongue is thicker between the second and third months of intrauterine life than it is at birth, and consequently takes up more space between the developing bony plates of the palate, thus interfering with their meeting and union. The muscles of mastication, becoming active about the third month, bring pressure from the mandible on the flexible bones of the palate, serving as a wedge and forcing the halves apart, a much wider breech resulting.

Normally, the upper jaw, from tuberosity to tuberosity, is smaller than the lower. If careful observations are made of a child with complete cleft of the hard and soft palate, it will be found that the upper jaw overlaps the lower. This makes it easy to see how the mandible may spread the two halves of the upper arch.

The normal position of the fetus *in utero* is such that a great part of the body weight may be thrown on the vertex, and the pressure exerted tend to force the mandible into contact with the sternal region and compress it against the forming hard palate. The head, being in a flexed position, with the symphysis of the mandible resting on the sternum, may add to the force exerted by the mandible.

PHYSIOLOGY

Deglutition is most difficult for a child with cleft palate, and, as a result, many of these children are poorly nourished. The milk taken, in the act of swallowing, regurgitates through the nose.

Both the palate and the tongue are important organs of speech, but the former is the more so. Not only is it essential in the enunciation of nearly all the elements of speech, but, owing to its direct attachment to the larynx, it is also an important factor in the production of the voice. It is in the articulation of consonant sounds that the palate is especially essential.

Fig. 3.—Case which could not be corrected by pressure of muscles of lip, nor could bony cleft be corrected. The first operation (right) was the Brophy bone operation, then the submucous resection of the vomer and removal of the section. The premaxillary bones were set back into the arch, fastened and immobilized.

SPEECH HABITS

It must be remembered that the acquirement of speech habits begins early in the second year and continues during the period of childhood. It is during this time that nature provides for the normal development of speech. Children appear

to inherit a tendency toward speech development and cases have been reported in which whole sentences have been uttered spontaneously without any preliminary practice. The more serious forms of defects of speech are those that are acquired during this formative period. It is then that faulty impressions of the elements of speech are stored in the auditory centers of the brain and faulty habits are formed in the use of the various mechanisms of speech.

Fig. 4.—Patient shown in Figure 3, after completion of lip operation. The Erickson operation for the elevation of the nose was also performed.

Time does not permit me to here cover the full physiologic function of the palate, yet in defense of early operation a few facts must be considered.

As surgical measures for the closure of the cleft palate are undertaken largely for the purpose of improving speech, they should be employed as long as possible before the formative speech period.

Habits of speech formed early cannot be changed without special instruction. To make a normal palate take the place of a cleft palate, the soft parts must be so manipulated as to avoid the formation of scar tissue. If incisions are made through the soft parts and measures are omitted to lengthen the palate, masses of cicatricial tissue will form with contractions.

Fig. 5.—Very broad unilateral cleft of hard and soft palate, associated with cleft of lip and nostril. (Compare Fig. 6.)

When a cleft of the palate is improperly operated on, faulty speech results, affecting the patient both mentally and physically. It has been said that a faulty habit of speech must be supplanted by a correct one, but it becomes more than a habit in these cases. It is a deeply rooted neuromuscular disturbance or perversion that has arisen from an effort on the part

of Nature to accommodate itself to developmental structural irregularities in certain important parts of these mechanisms. It is somewhat analogous to the effort on the part of the neuromuscular mechanism of the heart to accommodate itself to the presence of a faulty valve, but it is far more complicated because of the volitional and other physical faculties employed in the development of speech.

Fig. 6.—Patient shown in Figure 5, 2½ years after Brophy bone operation and correction of lip and nostril. (Retouched photograph.) The position of the nose and the general contour of the jaws are of interest.

Dr. Brophy designed a nipple which enables the breast-fed infant to take its food with little difficulty, and it is surprising how quickly it recognizes this and will poke its nose around in search of the nipple before beginning to nurse. He also designed a nipple for the bottle baby, made on the same principle.

FORMS OF CLEFT PALATE

The different forms of cleft palate will not be presented in this paper, other than to state that there are, as classified by Dr. Brophy, fifteen in number, and that the form definitely determines the time of operation, etc.

PREOPERATIVE TREATMENT

I have been convinced many times that the value of feeding an infant preparatory to surgical intervention has been sadly overlooked. Failure to secure proper nourishment is a valid reason for early operation. The general condition of the baby should be considered carefully. Too often, these children are brought to the hospital and subjected to operation at once. In two days, a cold develops which may have been contracted on its way there, and its effects, added to those of the anesthetic and operation, may result in pneumonia and death. Accordingly, it is my judgment that the services of a pediatrician should always be employed.

OPERATIVE TREATMENT

It must ever be borne in mind that the palate is one of the most important organs of speech and, being directly attached to the larynx, it is a most valuable factor in voice production. The articulation of consonant sounds is very difficult for children having cleft palate. I can recall many patients of mature age on whom I have operated for extensive cleft palate who had much difficulty in learning to talk, but, by keeping in correspondence with them for one, two or three years afterwards, one can assist them to learn to speak over again and more correctly. Great patience should be mani-

fested for those so afflicted, as they have more trouble than we are able to appreciate, and are most always too timid to seek our cooperation. We must remember that the closure of the palate is not the only thing sought. Most important by far is assuring the patient a flexible, resilient palate, which is so much needed in speech.

A baby with a complete cleft palate and either single or double harelip should be treated in three steps, (1) bone operation, if possible, within the first month to six weeks; (2) lip and nostril operation, six weeks after the bone operation, or earlier, if the bone operation has been a success and the splints have been removed; (3) soft palate operation, preferably about the twentieth to the twenty-second month.

The bone operation should be performed long before ossification is completed, the bones being more easily moved to the position desired and the shock to the patient being much less.

When there is a double cleft with premaxillary protrusion, the premaxillary bone must never be excised. A deformity follows which is far greater and more difficult to repair than that originally presented. It is, in fact, a calamity that cannot be repaired. With the excision of the premaxillary bones go the tooth buds, and the child is forever missing temporary as well as permanent teeth. They must be put back in position to form a normal arch.

Operations performed in early infancy afford the best results, despite the fact that very successful operations may be performed at almost any time in life.

It cannot be too frequently repeated that the first undertaking should be the closure of the cleft of the bones, because herein lies the success of the subsequent operations. With proper technic following, the normal physiologic functions of the palate are restored. The many complications encountered in this field try the ingenuity and patience of the surgeon to the utmost.

Certain definite steps must be carried out to assure the child a flexible resilient palate. A specially designed periosteal elevator should be used to separate perfectly the soft tissues from its periosteal attachment. Great care is necessary in the initial step of passing through the muscular mucosa, down to the periosteum, in the process of lifting the soft tissue.

The periosteum should be freed along the posterior border of the horizontal plates of the palate bones, extending down and back of the hamular process on either side. Very rarely is this accomplished in cleft palate surgery.

When the horsehair coaptation sutures are placed, no tension can be allowed, or sloughing will follow, and the operation result in failure. It is necessary, at this time, to place tension sutures of silver wires supported by lead plates, to prevent tension on the horsehair sutures, as described above.

POSTOPERATIVE CARE

In this operation, postoperative care is most essential. Isolation of bacteria being impossible, it is necessary to irrigate the parts after each feeding, and, in some cases, a half dozen times a day. When it is impossible to isolate an organism, it must be combated by other means, and, in this instance, constant irrigation is considered one of the laws of success.

In the last two operations, namely, that on the lip and that on the soft palate, great care should be exercised not to traumatize the tissue more than is necessary, as sloughing, particularly in the soft palate, is apt to follow.

In a staphylorrhaphy, lateral incisions should never be made unless it is absolutely necessary. One must avoid

severing the tensor palati muscle and nerve, for, once severed, they do not reunite. By traction in the act of swallowing and speaking, the tensor palati muscle dilates the pharyngeal orifice of the eustachian tube. Deafness often follows if the tensor palati muscle and nerve are severed.

Permanent sutures left in the mouth at the completion of any of these operations should not be of the type to absorb the saliva. Also, all materials except horsehair, silver wire and lead plates are constantly contaminated with different forms of bacterial life.

Operations on older cases are rarely completed without speech training.

Many men have been free in condemning the Brophy operation, but I believe that these men have not been successful in performing the bone operation as designed by Brophy. As evidence of this fact, no one can, I believe, show the functional and cosmetic results, generally speaking, that Brophy did during his active career. In my hands, the Brophy operation has been successful and has laid the foundation for better results than any other procedure known.

DISCUSSION

J. P. Henahan, Cleveland, Ohio: Dr. Shearer spoke of the importance of the operation for the removal of impacted teeth. The more experience we gain, the more importance we place on it and the surgical details connected with it. To date, there has been but little practical progress in the direction of true oral surgery among dentists. The great majority of us, as yet, have performed no staphylorrhaphy, no uranorrhaphy nor cheiloplasty. Many dentists, in fact, still believe that we are stepping out of our field when we perform any surgical operation beyond extraction. The great oral surgeons of this country today number only a few men. There never have been many men of fame in this branch of surgery, but there are fewer today than in many years. The country has some able men, but they are probably medical men with few exceptions. When is the dentist to take his proper place and be enumerated among the well known oral surgeons? What is to be gained, I ask, by having these papers presented to us if we make no greater effort than we have in the past to place our profession in the field of real oral surgery? The idea that Dr. Shearer gave us this morning is one that we all should think about. We should encourage our younger men to spend time under the tutelage of men having a reputation for skill in oral surgery. Let the young men spend their time in this way and, in turn, teach others. If we do not follow this procedure, one day, before the passing of the present generation, we will see no oral surgeons on our ranks. We have been talking regarding the latitude of the work of a well-prepared, well-trained dentist. The curriculum of every dental school in the United States today is at least equal to the curriculum of every medical school of, say, twenty-five years ago, and I say that it is as good as the curriculums of many of the medical schools of today, and, therefore, we send our men out thoroughly prepared, except for actual hospital experience. This we should provide for them. When this has been accomplished and the dental oral surgeon can prove his preparedness, there are no technicalities to hinder his progress. In my presidential address to this society ten years ago, I suggested that we sponsor a clinic to be established in the United States under the supervision of capable men, and our young men be encouraged to go there for the study of oral surgery and the therapeutics allied with it. The necessity for such an institution still exists. I believe that at this moment this organization is slipping and needs bolstering. We have done an excellent job in educating the dentists of the country in the art of exodontia. We have, in fifteen years, elevated exodontia and put it in a dignified position as compared to that of fifteen years ago. As a result of this effort, we have educated the specialists out of position. Today, the general practitioners are performing every op-

eration in exodontia, and if there is to be any justification for continued existence of our specialty, we must develop dental oral specialists in surgical procedure not included in the field of general dentistry and include all types of oral and pharyngeal surgery. Dr. Schearer described staphylorrhaphy and uranorrhaphy. There is no operation in the category of surgery that is more difficult than that of cleft palate and harelip, and there is no operation in which the safety, well-being and happiness of the patient is more involved. It, therefore, deserves the skill of a surgeon especially trained and accustomed to operating in the oral cavity, and here the dentist has an advantage.

A. L. Frew, Dallas, Texas: Dr. Shearer and I agree as to the method to be used in these cases. I use the Brophy method, with very few modifications. Dr. Shearer brought out many causes for this particular deformity. One that stands out in my estimation most prominently is the mechanical principle involved. It is claimed that heredity probably plays a big part, but we have gone into the history of probably 350 cases, including early pregnancy, and, with few exceptions, I have found that the prospective mothers did unusually heavy work for one in that condition. That is, their exercise, whatever they were doing, was too strenuous. For instance, I had one case of a prospective mother who helped her husband round up cattle down in the south part of Texas and she used a car to do it instead of using a pony, which would have had the same results probably, but during early pregnancy, she drove an old car all over that country. You can just imagine the jolting that she received. I have had many cases in horseback riders, in tennis players, in women who have worked in the field, doing heavy manual labor. I don't know that their activity was a cause, but the two go hand in hand. Whether the heavy jolting during early fetal life displaces the parts in question and holds them in such position that they fail to unite until it is too late for union to take place, I do not know, but I feel that that theory probably has just as much foundation as many that have been presented, for none of us know the exact cause. I shall keep to that theory until someone shows me that I am wrong. When in many cases we find a history of strenuous exercise and unusual jolting, there must be something to it. Dr. Brophy's fifteen forms of cleft palate I believe have never been questioned or enlarged on. They are still accepted as standard. One of the principal things in cleft palate work is to eliminate scar tissue, as far as possible. It is true that in many cases we have to make lateral incisions, but if those lateral incisions are made close to the gingivae, where the tuberosity is rounded, well back into the cheek, instead of down in the palate muscles, we will eliminate many scars. I find that certain operators make lateral incisions, carrying the incisions down into the soft tissue of the palate and binding the palate together by tape instead of using lead plates and silver wires, the Brophy method. Why wouldn't there be much scar tissue where that incision is made through the very soft part of the tissue? When the scar tissue is left, it is bound to draw up and a much greater tenseness of the palate result. The early operations are better because they offer the hope of better speech. The mortality rate will be lowered by placing these children in the hands of a pediatrician to start with and not operating until he so advises. I have had many patients that have been sent home and told to come back in a few months. True, they may go to some one else, but let them go. The older cases should be put in the hands of an internist and operation performed when the time is ripe. These are not emergencies. If we handle our cases in this way, the mortality rate will, as I know from experience, be lowered.

THE ASSOCIATION OF ORAL AND GASTRIC SURGERY*

By KARL A. MEYER, M.D., Chicago, Ill.

IN dental practice lie measures which will not only eliminate a certain amount of gastric pathologic processes, but will also better insure the efficacy of the gastric operations which may finally have to be performed. On both these counts, I enlist your aid.

One of the most important steps in the ultimate solution of a surgical therapeutic problem is determination of the etiology of the disease for which operation is to be performed. The etiology of peptic ulcer of the stomach and duodenum as yet has not been established. Several factors have been considered: specific infection, acid digestion, vascular disturbances such as thrombosis, embolism or spasm of the gastric vessels, neurogenic disturbances in the celiac plexus and vagal nerves, as well as in the brain, hormonal disturbances, the recurrent corrosion by irritating foods, and embryologic and phylogenetic disturbances in the gastric tissues.

Any or all of these factors may be involved in surgical diseases of the stomach. Yet some of these factors are palpably more important than others and more directly deserve our attention; for if we can eradicate these most important factors, the problems of gastric surgery are solved, and we can operate in these cases with better prospect of success.

One of the most important factors, if not the most important, is infection. The infectious origin of at least a large proportion of peptic ulcers has had vigorous adherents for many years. Attention was first called to its importance by the observation in man of the development of acute peptic ulcers during severe or fatal infections of various kinds.

These ulcers have been found in cases of erysipelas, pemphigus, puerperal sepsis, subacute bacterial endocarditis, septic forms of scarlet fever and smallpox, anthrax, etc. They may also appear in acute localized septic processes such as the septic peritonitis following a neglected appendicitis, and various acute suppurative lesions of the respiratory tract. Patients who are moribund as a result of such local sepsis often vomit a black hemorrhagic material. This hematemesis comes from the acute peptic ulcer which they have developed. Occasionally, in suppurative cholecystitis, strangulated hernia, ulcerative colitis, suppurative salpingitis, empyema or lung abscess, such an ulcer will develop.

The relationship between appendicitis and ulcer is especially striking. Both conditions are of frequent occurrence. Yet the association of the two is too frequent to be explained as a coincidence. The association is further supported by the cases of recurrent hematemesis from recurrent acute peptic ulcers which are cured by removal of an inflamed appendix. Certain cases of complicated appendicitis demonstrate well the connection

*Read at the Seventieth Annual Midwinter Clinic of the Chicago Dental Society, Feb. 28, 1934.

between a distant focus of infection and a peptic ulcer. In these cases, a thrombophlebitis develops in the appendicular veins. This extends to the ileocolic vein, then to the right colic vein, up the superior mesenteric vein to the portal vein and the liver; but when it reaches the portal vein, a retrograde thrombosis extends into the gastric veins. The thrombus in the gastric wall is infected and a localized septic enfarct develops. When this breaks down, the gastric acid eats into it and an ulcer forms. Sometimes, this thrombophlebitis does not extend in continuity, but pieces break off and septic emboli lodge in the gastric wall and produce the same picture.

Nor does this account as yet for the whole story, as, sometimes, not even septic emboli break loose, but only colonies of bacteria are transported in the same way to lodge in the gastric veins and produce an ulcer. Even the bacterial toxins alone can do the same thing. Peptic ulcer has been reported, for example, after botulism. This accounts for the ulcers which develop from remote foci in the fallopian tubes, chest, heart, bone and brain.

Besides this evidence drawn from clinical experience, there is an abundance of research evidence. In 1874, Boettcher isolated bacteria in peptic ulcers. Dudgeon and Sargent somewhat later identified a streptococcus in the wall of peptic ulcers. Using experimental animals, Letulle, in 1888, produced peptic ulcers, inducing a general pyemia by injecting pus intravenously. This was confirmed by Bezancon and Griffin, in 1899. Ever since the relationship between acute distant infection and the development of peptic ulcer was established, many investigators and clinicians have felt that chronic distant infection, acting perhaps not so violently, but in more prolonged manner, would be found to be similarly related.

Considerable clinical evidence had already accumulated to support this view. The symptomatology of a classic case of peptic ulcer runs in waves. There are attacks of varying duration separated from one another by periods in which no symptoms are present. The worst attacks usually occur in the Spring, when bodily resistance to infection is lowest; and sometimes in the changeable season of Fall. The patients often state that they "catch cold." Then, as they are recovering from the "cold," gastric distress begins. They are put on a rigorous dietary régime with alkalis or mucin, or whatever treatment is a favorite with their family physician. Their distress is controlled with difficulty or not at all. They may have to be put to bed. They vomit, they bleed, they may even go on to perforation and emergency surgical measures will have to be taken. After several weeks or months, the distress subsides. The patients can get up and go back to work, can stop their medicines, can eat anything they like and feel perfectly comfortable. This goes on quietly until Fall, when another infection develops and the condition flares up again.

During an attack, if the patient is operated on and the ulcer is excised, signs of infection are found in it. The ulcer is infiltrated with bacteria, which are either enterococci or a nonhemolytic streptococci. If the patient is operated on during a free interval between attacks, no signs of infection are found in the ulcer scar. The clinical association between recurrent and chronic appendicitis and chronic peptic ulcer is almost as striking as it is in acute appendicitis. But other chronic distant foci of infection are even more important. Many cases of peptic ulcer are associated with chronic tonsillar infection or with chronic sinusitis. Chronic cholecystitis and, in some cases, a chronic prostatitis may be

similarly involved. One of the most frequent sources of chronic infection is the teeth. The teeth are probably the most common clinically demonstrable source of chronic infection in all cases of chronic peptic ulcer.

Even in a well-educated clientele, 70 per cent of gastric ulcer and duodenal ulcer cases have been shown to present a pyorrhea alveolaris, an apical infection, or both. In addition, 10 per cent of patients were edentulous. Most of these patients gave a history which indicated that they had active oral sepsis when an ulcer first developed. In many of the cases, a residual infection was still present in the jaws. The infective matter from the teeth could theoretically reach the stomach by being swallowed, and then invade the gastric mucosa. In most cases, the spread is hematogenous, bacteria or their toxins reaching the gastric mucosa by way of the blood stream. If an ulcer has once formed, secondary infection of its exposed surface by swallowed bacteria may occur and may be a serious factor in ulcer chronicity. In most cases, with exceptions which I shall discuss later, the swallowed bacteria are promptly killed by the gastric acid. It may be that one of the reasons that hyperacidity develops is as a protection against the flood of bacteria. But the acidity itself is unfortunately detrimental, because it digests the ulcer wall.

Bacteria and their toxins can pass, according to Hurst, from the deeper tissues of the periodontal ulcers of pyorrhea alveolaris into the blood stream, and also from infected roots. The latter source is more important clinically since, from the external appearance, the teeth may seem perfectly normal. There is also, as you know, a type of streptococcal rarefying osteitis of the jaw which can persist for months or years after the removal of septic teeth. This condition is not infrequently found in peptic ulcer and must be treated simultaneously before the ulcer symptoms clear up.

In cases of chronic peptic ulcer, it is therefore my practice to secure routinely a complete dental examination, including roentgenograms. Similarly, when a patient with apical abscess or periodontal ulcer develops symptoms of peptic ulcer, the bulk of clinical evidence gives us the right to assume that the dental sepsis is one of the chief factors in the development and persistence of the ulcer, and that the two have to be treated together.

The experimental proof that this attitude of ours, namely, the recognition of the intimate association between dental sepsis and peptic ulcer, is justified, has been established by Edward C. Rosenow, formerly of this city. In his first studies, he examined fifty-four chronic gastric and duodenal ulcers excised at operation in man. In forty-two of these cases, he found streptococci in the deeper tissues of the ulcer. In five of these cases, he was able to isolate the same streptococcus from the neighboring gastric lymph nodes, which are so often enlarged during the inflammatory episodes of peptic ulcer. He found the largest number of bacteria in the most acute ulcers, and few or none in the healing ulcers. He then took the same streptococci, cultured them, and injected them intravenously in animals. In a large proportion of the animals, peptic ulcers developed; whereas, animals injected with other strains of streptococci rarely developed ulcers. The ulcers resembled those found in man in their localization along the lesser curvature of the stomach and in their gross and microscopic appearance. They tended to become chronic, to perforate and cause serious hemorrhage, just as in man.

Furthermore, from the ulcers produced by elective localization of the bacteria after their intravenous injection, Rose-

now was able to isolate the same streptococcus which, when injected into another animal, again produced a peptic ulcer. He isolated the same streptococcus from the spontaneous ulcers which are produced in the dog by the Mann-Williamson operation. These studies proved that causally associated with peptic ulcer is a specific strain of streptococcus which has a selective affinity for the gastric mucosa.

Then Rosenow found that he could isolate the same streptococci from the infected teeth of patients with duodenal and gastric ulcer. When the organisms were injected intravenously into animals, peptic ulcers were produced in the same way. In the infected teeth of patients without duodenal and gastric ulcer, these streptococci were absent. Haden and Bohan have confirmed Rosenow's observations. Of forty-five rabbits inoculated with bacteria from the infected teeth of patients having peptic ulcer, 53 per cent developed peptic ulcer, in comparison with 7 per cent of 535 control rabbits inoculated with similar material from patients without ulcer. These studies demonstrated that foci of dental infection can harbor streptococci which have a selective affinity for the gastric mucosa, invade the blood stream and produce a peptic ulcer.

These bacteria have been kept in latent life for eight and one-half years. After even long periods of quiescence, they can descend on the stomach again and produce a recurrent ulcer. The dead bacteria can produce a peptic ulcer. Even the exotoxins produced in the dental foci can selectively produce peptic ulcer without their streptococci being freed. As long as the dental foci persist, living streptococci, dead streptococci or their toxins can spill into the blood stream, lodge in the stomach, producing new ulcers and keeping old ones chronic.

What chance is there of curing a peptic ulcer permanently unless dental sepsis is simultaneously eliminated? The primary focus must be eradicated along with the calloused peptic ulcer which it has produced. Pyorrhea alveolaris should be treated thoroughly. In mild cases, after preliminary sealing has been carried out, the patient should be instructed carefully in the art of oral hygiene. The relationship of oral sepsis to gastric disease should be explained to him so that he may be encouraged to take care of his teeth not only as prophylaxis against the development of peptic ulcer, but as an adjuvant in its definitive medical and surgical treatment, if it has already developed. You are far more skilled in the details of oral hygiene and oral surgery than I am. It is my practice simply to turn my ulcer patients over to their own dentists to receive complete care and advice about their teeth. I insist that they abide religiously by whatever program of dental therapy is advised because it is my belief that the dental surgeon should and can share responsibility with me.

In moderate and in severe cases of pyorrhea alveolaris, I insist on active treatment by a dental surgeon as part of the preparation for gastric surgery. All pulpless teeth are examined roentgenographically and any showing apical infection I believe should be extracted. Even in edentulous patients, areas of rarefying osteitis should be looked for, because a residual streptococcic infection may persist for years after infected teeth have been extracted. The gums over such areas should be incised, and the bone scraped.

The best time for this program of dental surgical care is before the peptic ulcer develops. The next best time is during a free interval between attacks when the inflammatory process in the ulcer and its parent inflammation in the teeth are quiescent.

The patients come to us with active symptoms. We put them to bed on a rigorous diet and under medical care. The symptoms subside. About two weeks after this treatment is begun, oral surgical measures should usually be started. If they are started earlier, while the ulcer is still actively inflamed, the reaction may be severe and alarming. If undertaken later, when the ulcer is healed, the ulcer may be reactivated. The decrease in gastric acidity during the healing stages of ulcer especially favors reinfection by swallowed bacteria. Therefore, immediately after all operations on ulcer patients, the stomach should be washed out.

Frequently, we are not at liberty to choose the best time for our dental surgical measures. Under medical management, the symptoms do not subside, but persist and grow worse. Our hand is forced, and if we expect any kind of enduring cure, we must fall back on a gastric operation. A gastrojejunostomy or a gastric resection is performed. These operations afford excellent prospects of permanent cure. The unfortunate part of the situation is that, after we have cured the original calloused ulcer, there is nothing to prevent a new recurrent ulcer from developing from the foci of dental sepsis remaining.

Recurrent ulcers are a source of greatest exasperation to the gastric surgeon. They are infrequent, it is true, but each case which develops after radical and decisive surgical measures is a black eye in the face of gastric surgery. It is hard enough to perform this operation without facing the necessity of having to do it all over again.

To prevent this, I urge as one of the most important steps that, at the end of the three week postoperative period, all ulcer patients be examined for foci of dental sepsis and that, at that time, a program of dental surgical care be instituted to eradicate them. Patients should not be disturbed before the end of three weeks. The suture lines must have time to heal in solidly. Dental care should not be delayed after this period, for should a new ulcer develop, the bacteria which have settled within it may themselves act as a chronic focus even after the dental sepsis has been tardily cleared up. They will keep the ulcer active, propagate new ulcers and force the patient to be subjected to a second gastric operation in order to have them cut out.

Close cooperation between the dental and the gastric surgeon, i.e., surgical care of the peptic ulcer combined with proper dental treatment to insure surgical cure, will go a long way toward solving the problem of peptic ulcer in man.

ANISOCORIA OF DENTAL ORIGIN

By ARRIGO PIPERNO, M.D., D.D.S., Rome, Italy

INTERPRETATION of anisocoria is variable. It may be physiologic, and its incidence is from 1 to 50 per cent. Many people have inequal pupils, especially if examined in a diminished light.

If, in rare cases, anisocoria is congenital (because of morbid processes occurring during intrauterine life; for instance, an altered conformation of the iris, which is accompanied by facial asymmetry), in most cases, it results from affections of the nervous system, such as dementia

paralytica, cerebral syphilis, tumor, trauma, hemorrhage, a degenerative process or disseminated sclerosis, all of which can injure the pupillary reflex.

There is also another group of these cases that has no relation to the state of the cranial-spinal system, but is associated with conditions arising in different organs: the lungs (apical localization of incipient pulmonary tuberculosis), the ears, the heart (aneurism, aortitis, periaortitis), the spleen (splenic anisocoria, described by Signorelli), the teeth, etc.

The cases in this group generally reveal an irritation of the pupillary sympathetic nerve.

While the myosis (constriction of the

Rarefaction of periapical bone tissue of distal root of second molar and of underlying tissue of dental crown of third molar.

circular muscle fibers of the iris) is due to the stimulus of a nerve rod connected with the oculomotor, the anisocoria is due to the influence of sensorial and psychic excitement on the spinal dilator center.

This cylic-spinal center rejoins the neuro-epithelial dilator muscle of the iris through the communicant branches of the eighth cervical and first thoracic pair by the plexus pericarotideus and the opthalmic division of the trigeminal.

The connection of the sympathetic cord and the trigeminal nerve is as follows:

From the eighth cervical pair and first thoracic pair to the inferior cervical ganglion, to the middle cervical ganglion, to the superior cervical ganglion, to the plexus pericarotideus, to the trigeminal nerve through the ciliary ganglion (connected with the ophthalmic division, and containing dilator elements of the iris), the sphenomaxillary ganglion (connected with the maxillary division), the otic ganglion (connected with the mandibular division, of which the inferior dental nerve is the greatest branch).

Dr. Gaudissart, of Brussels, in an interesting study, "Elements de Séméiologie Pupillaire a l'Usage du Praticien," in the Belgian journal of medical sciences, *Le Scalpel,* of Oct. 29, 1932, writes:

> The pupillary dilatation to pain constitutes the most simple form of this reflex, although purely psychic conditions such as fright or anguish, may produce the same effect.
>
> Every emotion, every voluntary impulse, every awakening of attention, a muscular contraction, a simple squeeze of the hand may provoke a dilating movement. . . . The inequality of the pupils, without alteration of the reflexes, is more frequently a symptom without importance.

A. Peri, studying the effects of pain on the pupil *(Difesa Sociale,* September, 1931), affirms that any action affecting the body, provided it produces pain or emotion, brings a variation in width of the pupil; namely, mydriasis, and exceptionally, myosis. This inequality of pupils may be bilateral, yet more prominent on the side of the affected organ, when the pathologic condition irritates the dilator fibers of the sympathetic.

Although we may attach no importance to inequality of pupils when there is no alteration of the reflexes, I wish to report a case of anisocoria in a woman, aged 45, suffering for many months from a severe dental neuralgia. It was not easy to determine the origin of the neuralgia without a roentgenologic examination, and physicians and dentists failed in the diagnosis. Under the gum, the right lower third molar tooth,

horizontally situated, was pressing on the distal root of the proximal molar, which was apparently sound; but a careful roentgenologic examination revealed a rarefaction of the periapical bone tissue of the distal root of the second molar and of the underlying tissue of the dental crown of the third molar tooth, as shown in the accompanying illustration. When the patient first came to me, she was suffering from a severe neuralgic attack of the right lower branch of the trigeminal nerve, which did not yield to large doses of the common nerve sedatives; but what by chance did attract my attention was an evident dilatation of the pupil of the right eye. We agreed to extract the second right lower molar under local anesthesia, i.e., an ethyl chloride spray. The mydriasis continued after the operation, although the neuralgic pain was diminished by the abundant hemorrhage. The patient came back two days later with the pain nearly entirely relieved, and equality of the pupils established.

Many months after the operation, the patient wrote me that the pain had ceased, and the pupils were diametrically equal.

Although we do not attach much importance to this coincidence, it seemed advisable to report the case, as evidencing the intimate connection of the buccodental system with the remainder of the body.

108A Piazza S. Bernardo.

AMALGAM INLAYS

By V. A. SWEETNAM, D.D.S., Toledo, Ohio

THE cavity preparation for amalgam inlays should be similar to that for the cast gold inlay, except that the cavity walls should have a somewhat greater taper. Thin or attenuated margins should be avoided. The hopper type of cavity preparation as advocated by M. L. Ward [1] seems admirably suited to amalgam inlays. After the cavity has been carefully prepared, an impression is taken. A copper tube and compound are used in the same manner as in the indirect method for making gold inlays.

"Model kryptex" is worked into the tube impression to form the die. This material sets quickly, giving a hard, smooth, accurate working cast in a few minutes. The cavity is coated in the die with a thin coat of good separating oil, and a matrix is placed around the working model. The cavity is packed carefully with a good silver amalgam, and the matrix is removed and carved to form. The contact point is left of ample fullness. The amalgam is allowed to set thoroughly, and the amalgam is tapped or pushed from the "kryptex" die. The inlay is then inspected and replaced in the die, and all except the contact is finished.

When the patient returns, the inlay is tried in the tooth and the contact adjusted by removing the inlay and disking until the desired result is obtained. The inlay is given the final high polish and cemented to place.

I do not expect the amalgam inlay to be superior to or to replace the properly

1. Brown, R. K.: Present Status of the Cast Gold Inlay, J.A.D.A., 20:1842 (Oct.) 1933.

constructed gold inlay. The amalgam inlay does offer a chance to eliminate some of the following shortcomings, so often found in the ordinary amalgam filling:

1. Leakage due to faulty adaptation, which is prevented in two ways; (*a*) The packing is done out of the mouth, where we have a clear view and better access to the cavity. Any desired packing pressure may be used. (*b*) The joint between the amalgam and the tooth is sealed with cement so that it should be impossible for air pressure or other tests to show leakage.

2. Large overhanging gingival margins, flat improper contacts or unpolished interproximal surfaces for which there should be no reasonable excuse. It is easy to finish these surfaces properly outside the mouth.

3. Discoloration of the tooth substance and pulp irritation due to absorption of metallic salts into the dentin. The layer of cement seals the openings of the dentinal tubuli and covers the surface of the amalgam.

4. Thermal and galvanic shock. The cement layer tends to insulate the pulp against shock.

Studies That Widen the Sympathies

Professional work of any sort tends to narrow the mind, to limit the point of view and to put a hall-mark on a man of a most unmistakable kind. On the one hand are the intense, ardent natures, absorbed in their studies and quickly losing interest in everything but their profession, while faculties and interests "rust" unused. On the other hand are the bovine brethren, who think of nothing but the treadmill and the corn. From very different causes, the one from concentration, the other from apathy, both are apt to neglect those outside studies that widen the sympathies and help a man to get the best there is out of life. Like art, medicine is an exacting mistress, and in the pursuit of one of the scientific branches, sometimes, too, in practice, not a portion of a man's spirit may be left free for other distractions, but this does not often happen. On account of the intimate personal nature of this work, the medical man, perhaps more than any other man, needs that higher education of which Plato speaks, "that education in virtue from youth upwards, which enables a man eagerly to pursue the ideal perfection." It is not for all, nor can all attain to it, but there is comfort and help in the pursuit, even though the end is never reached.—Sir William Osler in "The Master-Word in Medicine," *J.A.M.A.*, 1903.

The Journal of the American Dental Association

212 East Superior St., Chicago, Ill.

C. N. JOHNSON, Editor

NEWTON G. THOMAS, Associate Editor

Published by the American Dental Association

All expressions of opinions and all statements of supposed facts are published on the authority of the writers over whose signature they appear, and are not to be regarded as expressing the views of the American Dental Association, unless such statements or opinions have been adopted by the Association.

Communications intended for publication in the scientific or literary pages of THE JOURNAL should be addressed to the Editor. All advertising or business matter should be sent to the Business Manager.

Subscription is included in the annual membership dues. The subscription rate to nonmembers is $3.50 a year in advance, this rate applying to both domestic and foreign subscribers. All foreign subscriptions are to be paid in United States money.

Editorials

THE COUNCIL ON DENTAL THERAPEUTICS AND THE DENTIFRICE QUESTION

In the course of its service to the Association, to the profession and to the public at large, the consideration of dentifrices has seemed to the Council on Dental Therapeutics to merit much attention, and accordingly it has gone into the subject with some care.

At the outset, there were certain principles that needed to be laid down as a basis for consideration, and during the entire activity of the Council these principles have guided the efforts of its members. One of the very earliest contentions of the Council related to the claims, or at least the intimations, on the part of the manufacturers that dentifrices were of therapeutic value, and that by their use the spread of dental disease might be minimized. It at once became necessary for the Council to point out the patent fact that any value that dentifrices might be expected to exert related solely to their cleansing properties rather than to any medicinal benefit, and this immediately made a vast difference in the mental attitude of the

profession and the public toward the whole question of dentifrices.

It was not contended by the Council that there was no value in the use of dentifrices, this being left more or less an open question, but that what value there may have been came from greater facility in cleaning the teeth through the medium of dentifrices than was possible or at least likely without their use. It should be stated that while the Council has made no definite pronouncement on the subject, it cannot be questioned that the use of dentifrices has resulted in the teeth of the American people being kept cleaner and the mouths more wholesome than would have been the case without them. If this is granted, it would seem to be sufficient justification for the use of dentifrices, always provided they are not of harmful nature and are promoted under the proper auspices as to claims of virtue, and honesty of advertising.

In this connection the following statement taken from the official rules of the Council is pertinent:

> Dentifrices (with special reference to those advertised to the public) may be accepted for inclusion in the list of Accepted Dental Remedies provided: claims are strictly limited to their efficacy as an aid in the hygiene of the oral cavity and particularly to their mechanical cleansing properties; no therapeutic, chemical or bacteriologic claims are made or inferred in their exploitation, etc.

In an attempt to clarify the dentifrice question, the Council, at its meeting April 21, 22, 1934, made the following statement:

> There is now available a definition concerning the limited functions of a dentifrice based on the best available evidence, namely: Dentifrices are products, generally mixtures, used locally on the teeth in conjunction with a toothbrush, without demonstrated medicinal, prophylactic or curative virtues. A dentifrice should not contain harmful or objectionable ingredients.

In connection with the consideration of dentifrices, a question is being raised as to the abrasiveness of the various products, and the Council is recommending to the manufacturers of dentifrices that they undertake investigation "to determine the relative abrasive and cleansing properties of the basic insoluble ingredients, and the finished dentifrices containing them, and that dentists insist on this information in definite form, so that the teeth of their patients may be guarded against undue abrasiveness of some advertised dentifrices."

This question of abrasives is inseparable from a consideration of

the subject of dentifrices, and it should be given the most careful deliberation by the Council. To this end, the following declaration was made:

> Beginning twelve months after the publication of this notice, no dentifrice containing a so-called abrasive or polishing agent will be accepted for, or retained in, Accepted Dental Remedies, unless a statement of the physical properties of the insoluble abrasive material and the finished product, and tests for determining them are made available.

A significant straw which indicates the way in which the wind is blowing is noted in the fact that "certain Government procuring agencies will not open bids on the purchase of dentifrices unless such dentifrices are acceptable to the Council on Dental Therapeutics on the date on which these bids are opened." It might have been expected that as definite a ruling as this would at once draw the fire of certain interested manufacturers, and consequently pressure has been brought to bear on the Government to ease these requirements, but the principle remains, and all dentists and others interested in honest promotion of these materials should urge the Government to adhere to the standards suggested.

This consideration of the work of the Council in connection with dentifrices is only one of the activities sponsored by the Council. In the "statistical summary of the Council's work," notation is made of a total of 547 products examined since the Council was organized, and it is doubtful that the members generally are aware of the scope and character of the work performed by this body. Already, it has accounted for the elimination of many spurious products from the shelves of the dentists, and has therefore saved the profession and the public much in the way of money that would otherwise have been spent for worthless products. What is of greater importance, it has doubtless prevented much injury to the consumers from the employment of deleterious products, and it is even conceivable that slow poisoning might easily result in certain susceptible individuals from using products of a questionable character. The latter statement, of course, does not so much relate to the ordinary use of dentifrices, as it does to the experimental use of many unworthy proprietary products that are offered to the profession.

Dental practitioners, like practitioners of the other healing arts, are great experimenters in a superficial way, particularly when free

samples are mailed to them of attractive looking products. But when it is realized that the dentist may know little about the ingredients of many of these samples, it should be considered the part of wisdom for him to seek knowledge as to their character from a reliable source before using them himself or recommending them to his patients. Such knowledge may be obtained by consulting the Council on Dental Therapeutics.

THE DENTAL CREED

To hold inviolate the sacred obligation involved in the practice of a profession.

To exalt the name and good repute of dentistry, and to honor its best traditions.

To cultivate the science and art of the profession by study, by research and by self-sacrificing devotion to duty.

To strive for the loftiest aim of human endeavor—the prevention of the dismal toll of disease.

To preserve the natural organs and keep them in a state of health and comfort, thereby fulfilling the highest destiny of our calling.

To restore, as best we may, by facile art, the seemly form and effective function of lost parts, when the ravages of decay and disintegration have robbed the hapless victim of the heritage that nature gave him.

To rescue the human countenance from the blight of abnormality, and to mold it into lines of symmetry and grace.

To take the sunken and shrivelled features of senility and decrepitude, and smooth them into fullness of form and harmony of contour.

To reach out the helping hand for the relief of pain, and to willingly bring succor to the poor and needy.

To soothe the jangled nerves and change the drawn lines of agony to the blessed relief of peace and repose.

To wave a magic wand over the piteous, eager faces of deformed little children, and transform them into comeliness of outline and the very image of divinity.

To minister tenderly to the pathetic ills of the aged and infirm, and to vouchsafe for them a beneficent surcease for their declining days.

To winnow selfishness out of the minds, and consecration into the hearts of the profession.

To weave bit by bit with toil and travail, with trial and error, with hope and despair, with failure and triumph and with tenacity of courage and conviction of faith the tenuous fabric with which our professional manhood is draped.

To keep the faith in the face of all the wanton waves of tempting greed of gain.

To foster the soul of dentistry as well as the science, the heart as well as the mind.

To proclaim the ethics of professional conduct, and to live a life of servitude and sanctity rather than to barter or to trade.

To give rather than to get, to lift rather than to lean.

To be one with the great throbbing, aching heart of humanity, and kindred to all the noblest desires and purposes of life.

To attend to old and young alike with zealous care, and with an eye single to the demands of duty and the response of sacrifice.

And last, to seek from day to day with patient mien, to make the world better and humanity happier.

This then is the dental creed, submitted in fair faith, and dedicated to the sublime service of mankind.

DILEMMA OF ETHICS

We hear often of professional ethics, but of course know that there is no such thing. Not that this statement, in its making, assaults or insults the professions; rather it releases ethics from any modifier. "Professional ethics" is as reasonable as a "professional" multiplication table. One might as well individualize one man's circulatory system. Do it and physiology collapses. The same with ethics.

The little code compiled for the guidance of amateur professional people assumes that the beginner has reached maturity unballasted with social ingenuity. He is a dubious risk in a new relationship;

hence, a primer is put into his hands to save him from causing offense. To any man, such a code is either amusing or offensive according to the state of his mind. Do his mentors suppose that he doesn't know first principles? He becomes momentarily irate. Then, taking a wider view, he decides that the code is a gratuity, a kindly time-saver, a short cut to success as a member. It saves one the worry of thinking about internecine problems.

Let us see. There is personal advertising. There is the split fee. There is calumny of one's fellow in practice. There are multiple prices. There is the use of mystery, the waving of hands and throaty emphases to enhance a fee. And so on. Not an item in the list but is amenable to the gumption of primitive self-respect. What is distinctively professional about any of these questions? Nothing. The beginner mutters something about honest men needing no oaths and dishonest men heeding none. Perhaps in their most far-reaching aspect, ethical codes serve to demonstrate how far men and organizations in daily life get away from them.

The problem of ethics has grown a bit complicated in most professions. Always there are to be found in high places men who grow redundant when they discuss the subject. They become platitudinous. They use mossy words. They seem to fear lucidity. They are what is termed diplomatic. They have nothing to say, and because of sheer cowardice or mental indigence put all the charm of poetry and prose into saying it. Call their attention to it and they are hurt, distressed by the questioner's brutality. Ethics is something to sing or sob about; it belongs to the realm of poetry, of metaphysics, is a matter of soul and not of body, of dreams and not of daily life.

Ethics like its great associate religion can be depended on to create endless argument, heatful, malignant altercation. It may be pitiful or amusing according to the seat occupied. If a man asserts himself as ethical, he is one with the Pharisees. If such a man criticizes, he is one with the fox and the unreachable grapes. If he is silently progressive in his ethics, he has a hidden motive. Sometimes the subject is swept aside, with the assertion, shallow enough, that ethics is a personal matter—something indeed that it can never be. Ethics exists only where another is concerned. But so the discussion goes.

It is safe to say that no major life principle is obscured from the eye that would see. Likewise, the basic values may be simply put. That the good of organized society is the real standard of ethics seems unarguable. To debate that is to debate an axiom, which is folly. So when jungle methods, underworld procedures appear in parties of any sort, they are classified with simplicity and ease.

There must be a basic note for the harmonizing of human activities. Or, oppositely, ethics cannot be a matter of "as you like." Visualize in action men and women individualized to the exclusion of a common bond. Let all husbands try it, all wives. Let all in a waiting line attempt it and see the result. Society drops to its lowest level. No basis for professional ethics there, rather the cornerstone of anarchy. That is the weak spot of our political system, the cause of our dismantled economics. Professions, democracies can't rear themselves on that principle. When they attempt it, they become victims of contempt. Right can be universalized; wrong can never be.

Again, the basis of ethical obligation is what we are. Professional men lift themselves from the ruck by the very essence of their calling. When a man says "I am an American," he creates an expectancy not applicable to the state of a Kaffir. The years of training, long association with science and art, with principles, the essentiality of truth, set professional men apart. They are in a high place. Some one has said, "The greatest thing about modern science is not its discoveries, but its reverence for truth, its attitude of mind, its preciseness." The medical scientist has developed an exacting supremacy. He must carry the gifts of his science into his practice, his organizations, his life.

Years ago, dentistry set a standard for itself in keeping with its high service. It coined phrases that would have been boastful had they not been sincere. Those phrases had in them the idealism of their makers, but when those phrases were formed, the new organization had its dilemmas. It could not quite "come clean" with that start. Other dilemmas arose, and what had been looked on as compromise took on a semblance of the acceptable. With acceptance, the organization had to develop an astigmatism or myopia, not to mention a tortuous logic. Compromise, the curse of all group activ-

ities, meant the inevitable diplomacy, with its suavity, its evasion and statecrafty silence.

If items must be named, there was the conscienceless journalism with its advertising, nondiscriminating editorial practice, educational institutions that made gain their primary motive, the high offices of the organization the objective of the unscrupulous. A sizeable dilemma of ethics may be looked for wherever the ideal runs counter to financial gain. The thrill of profit is always greater than the thrill of a commanding conscience. Congratulations for doing right never thrills as do congratulations on a money making investment. And ethics balanced against financial loss is soon discredited. Nothing is more pathetic than a group of men who are sworn to sound practice quibbling and bickering and squirming when ordered to present arms in defense of their standards.

It is a dilemma to have to drag out the code, face its implications and penalties, be forced to repeat in unison its lip-honored phrases in a new emergency, particularly after a long period of self-indulgence while the Rule Book lay in the drawer forgotten or recalled only at intervals by reference and for amusement. Such a time is now. We are being told that the old earth has passed away and the travail of a new birth is upon us. We are told that we have unwittingly seeded our small plot for new conditions that call for wide readjustments. A moral or almost scriptural tone is in the air advising, exhorting to a new fraternalism with the poor and needy. "Wisdom and charity," it is said, "have loitered behind skill and inventiveness." The ferment of our moral idealism has gone meagre and watery. "Blind selfishness has held back happiness and contentment." "We have hitched our wagon to the wrong star; we must find our joy in service," says one. "I thought that was what professions were organized for!" exclaims another. They were, but evidently they have forgotten.

Ethics have a habit of lying inert apparently, of hibernating, submitting to a sort of obliteration for long periods and then suddenly, at inauspicious times, rising up embarrassingly, to make demands. The occasion may be forced on an organization from without. When it is, embarrassment and shame result. It may come from within. Then it testifies to the vitality of the institution; then it

commands esteem. In either case, it entails hard words, hard feelings and, what is more painful perhaps, financial loss. This is usually the final test of integrity, of ethics. Chemical cautery could scarcely be worse. What shall we do? Of course, we shall listen to the politically minded. The ethically ambidextrous will be verbose. There will be much blending of words and symphonic phrases to smoothe and soothe. The climax will be, "but we can't afford it." Ethics is doomed to suffer loss, it is true, but when ethics proves itself sound, it is as certain of gain. In the strength of that faith, the ethically true can reply, "You can't afford not to."

"You can't convert the world" is the usual rejoinder to a discussion of ethics, but the answer to that is "The world is as good as it is because somebody has kept on trying."

T.

THE JOURNAL: WHO READS IT?

At times, an editor attempts to visualize the journey, the destination, the reception of his journal. He scans the pages of a near-at-hand copy from frontispiece to back and muses: Who reads the scientific articles, who the technical ones? Who is interested in the Council's activities, the Bureau's programs, the aids that the Library has to offer? Who reads the advertisements? What members, and how many, are reading THE JOURNAL?

He goes into action, and frames a question for the business office. In reply, the files are thrown open. Here are answers to an advertisement tucked away in the back pages, answers by thousands. Here are pleas for back numbers to complete volumes, many more than can be supplied. Those pleas come from everywhere—the distant places of five continents. Let an advertising bureau bear witness: This bureau wrote to 400 dentists picked at random throughout the United States, asking them to number the fourteen journals listed in the order in which they ranked these publications as advertising mediums. In the 205 replies received, eighty-seven gave THE JOURNAL first place. And the next figure was thirty-five, THE JOURNAL tabulating almost the sum of the preferences expressed

for all of the other periodicals listed. The business office would have supplied more, but the editor, with whetted zeal, would interview the other departments.

A pause at the subscription desk: What is news here? Students to the number of 550 are subscribing to THE JOURNAL; and, in addition, general subscriptions, outside the membership, amount to 750. A fine showing of reader interest!

To a question addressed to the Librarian: "What proof have you that our JOURNAL is read? the answer came: "We receive from 1,000 to 2,000 requests for books or packages listed in THE JOURNAL four or five times a year. As many as seventy requests have come in for a single book. Small insertions amounting to less than a single page of space sold 15,000 copies of the booklet 'Your New Teeth.' As an incidental service, the Library Bureau sold $685 worth of books during the fiscal year ending June, 1934. The Library Bureau"—but the editor was off again.

Now to the Bureau of Public Relations, he addresses his question: "What evidence have you that our JOURNAL is read by our membership?" The reply: "As a result of a two-page announcement of the 'Care of the Teeth' booklet in the December JOURNAL, and a brief follow-up in the January issue, the Bureau sold 20,000 copies in six weeks. Sales of materials listed in THE JOURNAL are constantly increasing, showing a 400 to 500 per cent improvement over a short period. To find the announcements regarding the items for sale, hosts of copies in hosts of offices must have been scanned page by page."

And finally the Council on Dental Therapeutics: Here, volumes of letters were forthcoming, commenting on reports, letters asking advice, letters offering encouragement, letters of approval, letters of modest or of extravagant commendation, letters from individuals and letters representing component societies. New books on oral surgery (Mead), mouth hygiene (Fones) and anesthesia (Seldin) were produced to show the use of Council reports published in THE JOURNAL, quotations ranging from paragraph to pages. Teachers were named who use the material in their classes. So it appeared again to what extent THE JOURNAL is thumbed and dog-eared because of its interest and value to the profession. Likewise, the editor

saw with greater clearness how far-reaching is this agency of the American Dental Association in shaping the thought and practice of American dentistry. Education through THE JOURNAL!

An encouraged editor returns to his desk. He picks up the copy he had scanned and scans it again. It is used, is read, is doing a service. It can, of course, be improved. He would appreciate suggestions. It must lead, raise, instruct. Its direction is upward. It is not perfect, but perfection is an ideal always to be striven for, if never quite attained.

T.

Obituaries

HARRIS W. McCLAIN, D.D.S.

(1881-1934)

Harris W. McClain, a past president of the Chicago Dental Society and of the Chicago Association of Orthodontists, died, July 16, of heart disease, in his office in the Pittsfield Bldg., Chicago. He was 53 years old.

Dr. McClain received his dental education at the Northwestern University Dental School, where he graduated in 1917. He specialized in orthodontia, in which he had a wide practice, and on which he spoke with authority. He was a member of the American Society of Orthodontists, in addition to his other dental association affiliations. He was an associate professor in the department of orthodontia of his alma mater from 1917 to 1924.

Dr. McClain was a member of the Medical and Dental Arts Club, the Club of Northwestern Men, and the Birchwood and Rolling Green Country clubs. The widow, a daughter, Gertrude, and a son, John, survive.

PRACTICE IN PARAGRAPHS

This department is intended for busy readers. It aims to tell a vivid story in a few words. Items should be of a practical character, and free from padding—not more than a paragraph or two. We exact no limit, but two hundred words can tell most of these stories. Send in your ideas; they will be welcome.

Tolerance of the Patient—The degree of tolerance of the patient toward orthodontic procedure decreases with age. The youngest child, properly approached and handled, makes the best patient.—*Frank A. Delabarre, Boston, Mass.*

Oral Examination—Examination of the mouth is never complete without tests for subgingival hemorrhage, which always denotes an ulcerating surface. The test is made by exerting simultaneous pressure on the buccal and lingual surfaces of the gums with the tips of both index fingers. One should ever bear in mind the fact that Vincent's organisms are the cause of nearly all subgingival ulcerations that do not heal after thorough scaling and polishing of the teeth.—*P. G. Puterbaugh, Chicago, Ill.*

Treatment of Incipient Proximal Caries in Posterior Teeth with Nitrate of Silver—When there is a mere etching of the enamel or the dentin is only slightly involved and the secretions do not reach the dentin, this treatment is indicated. The means of locating these is the roentgen rays. From the occlusal surface, just back of the marginal ridge, drill a well into the area involved, using a No. 1 round burr. Apply the rubber dam, drying the contact point well with a small amount of alcohol. A good way to test the condition of the tooth structure between wall and contact point is by the use of Howe's ammoniacal silver nitrate solution. Into the dry well, place one or two small crystals of silver nitrate and reduce to powder. Fill well with mat or foil gold. Remove the dam, polish the filling and remove the silver discoloration on the surface of the tooth. We get reduction of pure silver from the silver nitrate in the presence of the organic material of the tooth. This silver penetrates the dentin and the tufts and spindles of the enamel, but does not reach the pulp. Before trying the treatment in the mouth, use some freshly extracted teeth and make the treatment. After two weeks, section and note results. This operation has been a regular procedure in my office for six years with marked success.—*H. K. Kellogg, Louisville, Ky.*

Cleaning a Vulcanite Denture—To clean a vulcanite denture before repair is made, place the denture in an evaporating dish containing enough commercial hydrochloric acid to cover the denture. Heat the acid over a low flame until the fumes are given off by the acid. Remove the denture from the acid bath and rinse under running water, then neutralize any traces of acid that may remain on the denture in a solution of sodium bicarbonate.—*E. C. Pendleton, Chicago, Ill.*

Controlling Hemorrhage—While it is, fortunately, not often necessary for the dentist to resort to artificial means for controlling hemorrhage, it is well to know how to do so when an emergency of this type arises. Unless a small blood vessel is severed at the time of operation, when it becomes necessary immediately to ligate the vessel to stop hemorrhage, most cases of unusual bleeding are of a secondary nature, occurring some hours after the patient has left the office. When the patient returns, the thick clot is removed and the wound washed with hot salt water. A sizable pledget of cotton is immersed in fibrogen and applied to the socket. (Monsel's solution may be substituted.) Over this is placed a large wad of sterile cotton and the patient is instructed to bite firmly on this pack for a period of about ten minutes. It is essential that the cotton pack be large enough and firm enough to cause considerable pressure. If the wound is in such a place that the pack cannot be held in place by biting, it is necessary for the operator to hold it firmly the required length of time. In most instances, this alone will stop bleeding, but, as a precautionary measure, a second application is made and the patient is dismissed with instructions to hold the pack *in situ* as long as possible.—*R. N. Douglas, Elkhart, Ind.*

Heat or Cold, Which?—There is, perhaps, no subject in clinical oral surgery on which more confusion exists that that dealing with the therapeutic indications of heat and cold. Neither of these agents has a curative effect on inflammatory and traumatic conditions in which they have been applied for long periods of time. Both heat or cold are used for their analgesic effects and the comfort they give the patient. Cold, like heat, has a different action according to the period of time during which the tissues are exposed to its influence. Cold causes local vasoconstriction in brief exposure; vasodilation in prolonged exposure. Application of cold, for brief periods only, is especially indicated for relief of pain and discomfort resulting from sudden traumatic swelling and exudation following extraction or other surgical treatment of the mouth tissues. The usefulness of heat, aside from the comfort it gives in painful and inflammatory conditions, depends on the local hyperemia induced by its action, for hyperemia is a fundamental part of the body's defense against bacterial invasion. Heat is a vasodilator during a brief application and a vasoconstrictor when applied for long periods of time. Its chief usefulness in dental surgery, in addition to other supportive measures, lies in the preoperative treatment of those early inflammatory lesions wherein localization of an abscess is sought prior to incision and evacuation of purulent fluids, and the intermittent application for relief of pain and drainage after that. Continuous application of cold or heat without periods of rest will cause a dangerously diminished blood supply to a part much in need of it and is, therefore, contraindicated. —*Emil L. Aison, Chicago, Ill.*

Problem of Malocclusion—Malocclusion is a problem of growth and development. Its correction should conform to the natural sequence of that process. The growth in arch width in the deciduous molar region is normally completed before their exfoliation. Orthodontic stimulation in that direction should be applied before root absorption of those teeth decreases their anchorage value too greatly. Since lack of adequate arch width is the most constant attribute of malocclusion, this is of great importance.—*Frank A. Delabarre, Boston, Mass.*

COUNCIL ON DENTAL THERAPEUTICS

PERALGA—NOT ACCEPTABLE FOR ACCEPTED DENTAL REMEDIES

The following report, after adoption by the Council, was sent to Schering & Glatz, although the Council considered the product on its own initiative. The firm offered no evidence which would cause a revision of the report of the Council, although they wrote in part: "In the meantime we reserve the right that if we find our interests affected by any erroneous or unsupportable statement appearing in any publication, to seek such legal redress as our advisors in such matters may suggest." Since the firm offered no evidence to cause a revision of the report, it is presented for the information of the dental profession.

SAMUEL M. GORDON, *Secretary*

Peralga is declared unacceptable for A.D.R. because: a frank statement of composition does not appear on the label (Rule 1); unwarranted therapeutic claims are made (Rule 6); the name does not express the composition of the product, and the Council cannot accept a proprietary name for what is essentially a mixture of two well-known drugs (Rule 8); and a mixture of an analgesic and hypnotic in fixed proportions cannot be considered in the interests of the dental profession and the public (Rule 10).

THE HISTORY AND CLAIMS OF PERALGA

Peralga was introduced by Schering & Glatz, Inc., New York, about ten years ago, with propaganda reminiscent of the foreign "synthetic" drug. In Europe, it is sold under the name Veramon.

About 1923, Peralga was stated by the proprietors to be a "definite chemical compound," and a structural formula showing one molecule of diethylbarbituric acid in combination with two molecules of amidopyrine was used in advertising. Later advertising implies and infers a definite compound of the same composition, but the firm does not go so far as to endow the product with a formula. Even after a refutation of the claim of a synthetic character about nine years ago, Peralga is, according to Schering & Glatz, "one of the results of modern creative chemistry and pharmacology." A large part of the advertising appears to be based on this claim. The following quotation is typical of the claims to dentists concerning the origin of the product:

Peralga had its inception in an ingenious application and extension of the noted Swiss pharmacologist Buergi's teachings on the possibilities of "compounding therapeutic principles." With the fixed purpose of producing a synthetic drug which would simultaneously afford pronounced pain relieving and highly sedative action, show a high degree of freedom from the toxicity and the habit forming tendencies of the opiates and require smaller doses than its component principles, the most important synthetic analgesics and hypnotic-sedatives were closely studied in relation to their suitability.

Preference was finally given, on the one hand, to dimethylamino-phenyl-dimethyl-pyrazolon (amidopyrine), and, on the other, to diethylmalonyl-urea (diethylbarbituric acid) which stands in the forefront of modern hypnotic sedatives.

By combining both in the proportion of two molecules of amidopyrine to one molecule of diethylbarbituric acid a new compound with distinctly different chemical and physical properties was obtained, while its pharmacologic characteristics precisely are those sought by Starkenstein, viz: elimination, by mutual suspension, of the toxic effect and augmentation, by mutual accentuation, of the analgesic-sedative action of the components.

It is advertised to dentists principally on an appeal to fear of apprehension and pain arising from dental operations, and to some extent as a substitute for well-known hypnotics.

The summary of its indications to dentists is as follows:

1. To dispel the anxiety of anticipated pain and pave the way for a smooth operation.
2. As an efficient analgesic-sedative—to minimize pain in the dental chair.
3. For the relief of the pain, trismus and general discomfort associated with post-operative or post-extractive work.
4. To facilitate radiographic procedure with the nervous patient.
5. To reduce the effective amount, and augment the potency of local anesthetics.
6. In the management of the child, PERALGA provides safe and rational pre-operative preparation.
7. To allay the pain associated with difficult dentition.
8. As an effective substitute for the bromides in heavy dosage, morphine, and its derivatives and the old-type coal-tar products.
9. In periodontitis, pulpitis and pericementitis, PERALGA'S highly analgesic properties will be found distinctly beneficial.
10. To relieve the dental pains of obscure origin frequently experienced during pregnancy, menstruation and the menopause.
11. To dispel "headache" of other than dental origin and make for greater tractability of the patient.
12. As a remedy for the dentist himself to allay the nervous tension incidental to a busy practice.

Peralga is obtainable by the laity without a written order from a dentist or physician, except in the few states and municipalities that require a written order from a physician or dentist for barbituric acid or preparations containing it. The name "Peralga" does not indicate that the product is made up essentially of two potent drugs which, on the whole, should not be used except under the direct supervision of a dentist or physician.

THE CHEMISTRY OF PERALGA

It is to be noted that Peralga is stated to be a definite chemical compound of one molecule of diethylbarbituric acid (barbital) and two molecules of dimethylamino-phenyl-dimethyl-pyrazolon (amidopyrine), and, according to Starkenstein, whom the firm quotes extensively, it is made by heating a mixture of the two drugs in the proportions given above. It is also noted from advertising on Peralga that Schering & Glatz infer that this combination of amidopyrine and barbituric acid acts as a single unit. The emphasis is placed on the capacity of the product to relieve pain.

Schering & Glatz attach much importance to the chemical combination of the hypnotic and the analgesic, but laboratory experiments both of a chemical and of a pharmacologic nature have failed to reveal any difference between the action of a simple mixture of barbital and amidopyrine, and that of Peralga, in which the two components are said to be combined, chemically.

The circumstance that Peralga would not act in the body as a definite chemical compound as claimed was shown as far back as 1923 by the American Medical Association chemical laboratory and by the pharmacologic experiments mentioned. It was reported that 26.1 per cent of barbital and 72.0 per cent of amidopyrine could be recovered from Peralga by simple methods.[1]

The firm refers to Pfeiffer[2] thus: "Pfeiffer has demonstrated that Peralga is indeed a definite, well-characterized new compound." Reference to the original article shows no mention of Peralga, and the compound said to have been isolated by Pfeiffer is reported

1. J.A.M.A., 30:942 (March 31) 1923.
2. Pfeiffer, Paul: Ueber eine Verbindung aus Veronal und Pyramidon, Ztschr. f. Physiol. Chemie, 146:98, 1925.

by him to have a ratio of one molecule of each compound and not two to one, as asserted by the firm. Hence, the reference to Pfeiffer's work by the firm is misleading.

PHARMACOLOGY OF PERALGA

The firm claims that Peralga had its inception by an extension of the teachings of the noted Swiss pharmacologist Buergi, and was originated by Starkenstein with the object of producing a "synthetic drug" (the "synthetic drug" part need not be taken seriously in view of the statements above) which would simultaneously afford pronounced pain relief and highly sedative action; and the findings and conclusions of Starkenstein are claimed to have been confirmed by the experimental work of R. Magnus.[3] The firm, for example, says: "The findings and conclusions of Starkenstein have more recently been submitted to searching experimental criticism by Magnus of the Pharmacologic Institute, University of Utrecht (Holland) and fully confirmed by him."

This statement is misleading because it does not fully set forth the methods, results and conclusions reported by Magnus. Nor does the firm's literature make reference to the discrepancies found in, and objections made to, Starkenstein's claims and results reported by others. A brief survey of the facts and their significance is therefore desirable.

In the first place, Magnus did not experiment with prepared mixtures of barbital and amidopyrine in the same proportions as are present in Peralga. Magnus tested the effects of barbital, amidopyrine and Veramon (which is the same as Peralga) on the postural and labyrinthine reflexes and reactions in rabbits. Although Magnus stated that his results, in the main, confirmed the statements of Starkenstein, the validity of the data obtained by Magnus on postural and labyrinthine reflexes in rabbits as tests of therapeutic usefulness, such as analgesic and hypnotic actions, can be questioned. Moreover, a consideration of Magnus' data on a phase of the antagonistic action observed leaves the value and usefulness of a mixture of amidopyrine and barbital, such as Veramon or Peralga, considerably in doubt.

Magnus reported that the postural and labyrinthine reflexes and reactions in rabbits are affected oppositely by amidopyrine and by barbital, being stimulated by the former drug and depressed or paralyzed by the latter. He concluded that in Veramon the stimulating action of Pyramidon (amidopyrine) is completely neutralized by Veronal (barbital) and that, on the other hand, by Pyramidon the depressing action of Veronal is, according to the dose given, either strongly delayed or greatly diminished or completely neutralized. The striking thing in Magnus' report, for the present purpose, is the delay, diminution, or neutralization of the typical depressant action, which would include the hypnotic action of barbital caused by the simultaneous administration of amidopyrine, an important phase of the antagonistic action of these two drugs which the manufacturer fails to mention in his advertising literature (a booklet entitled "To Ease the Path to and from the Dental Chair," page 9). Although Magnus did not interpret the significance of these interesting effects of amidopyrine on the action of barbital, it follows from his results that the most important effect of barbital, namely, promotion of sleep, quietude, rest and the allaying of apprehension, as in preanesthetic medication, and the like, in dental practice, is interfered with or lost in such a mixture as Veramon (Peralga). If enough of the mixture is given, only the progressive effects of barbital poisoning are obtained, as indeed occurred in those experiments of Magnus in which large doses were tried. Hence, nothing could be gained in therapeutics by using such a mixture, the value and usefulness of which can be seriously doubted. Moreover, the destructive effects of amidopyrine on barbital action, as in Veramon (Peralga) tend to refute the principles implied in Buergi's laws, which are emphasized in the manufacturer's literature.

It must not be overlooked that the antagonistic actions of the two drugs amidopyrine

3. Magnus, R.: J. Pharm. & Exper. Ther., 29:36 (Oct.) 1926.

and barbital are not uniform in all species, and hence the free transfer of experimental results to man is not justified. For instance, Kaer and Loewe[4] found, in opposition to the results on rabbits reported by Starkenstein, that there is never an antagonistic action of amidopyrine and barbital in guinea-pigs, but only a synergistic action. Certain doses, however, appeared to offset certain effects. In mice, Santesson[5] found Veramon to be more toxic than a mixture of amidoyprine and barbital, contrary to his own, and to Starkenstein's, results in rabbits. Santesson also pointed out that Starkenstein failed to compare the effects of these drugs in mixture in the same proportions as Veramon, and when Santesson did make such a comparison his findings were exactly the same as with Veramon. Santesson also showed that it is not necessary to inject the amidopyrine together with the barbital, as in the use of the alleged compound Veramon; only the barbital had to be injected first, since the rapid convulsant action of amidopyrine, when given alone, endangered life. Accordingly, Starkenstein's claims for Veramon (Peralga) were found to be uncritical and misleading.

The firm makes much of the teachings of Buergi concerning the potentiation of action of drugs having different sites of action, but no satisfactory evidence of potentiation in such mixtures has been presented. Indeed, E. Starkenstein, the reputed discoverer of Veramon, later said: "The combination present in Veramon cannot be looked upon as a confirmation of Buergi's rule. *(Die in Veramon Vorliegende Kombination kann somit night als eine Bestätiguing der Bürgischen Regel augesehen werden.)*[6] After citing as an example, the many possible sites of action for a cardiac remedy, Starkenstein adds that "a construction of a combination with the view of a desired addition or potentiation according to Buergi's rule is as yet hardly possible."

Reference to Magnus' work in advertising, which was done after the report of the American Medical Association, is again shown to be misleading in the light of the following experiments, recorded in 1923.

A mechanical mixture of barbital and amidopyrine in the same proportion as in Peralga, and also some Peralga, were examined at the pharmacologic laboratory of Cornell University Medical College for comparative tests. The summary of the laboratory report was as follows:

> We can see no difference in the behavior of cats toward similar doses of the two preparations; the mechanical mixture made in the A.M.A. Chemical Laboratory and the preparation of Schering & Glatz, and they show very little difference between similar doses of barbital and those contained in Peralga. Of course, there is no chance to make observations on cats that would show analgesic actions in headache. But since the observable effects on cats are so nearly identical, it is only fair to presume that the "synthetic" and the mixture are practically alike in action.[7]

The Council admits that the barbitals may augment the actions of such analgesics as amidopyrine, acetphenetidin, acetanilid and acetylsalicylic acid, and, when prescribed by the individual dentist, such mixtures may be useful for the relief of pain, especially for pain of neuralgic character,[8] but the prescribing of such polypharmacal mixtures should not be indulged in indiscriminately. The profession must not lose sight of the position that when two or more drugs are combined for therapeutic effect, combination should be effected as far as possible on the individual dosiometric requirements and idiosyncrasies of the patient, a position that needs no argument where the best interests of the patients are concerned.

The directions for the use of Peralga in general call for one or two tablets without

4. Kaer and Loewe: Arch. Exper. Path. Pharm., 114:329, 1926.
5. Santesson: Arch. Exper. Path. Pharm., 118:313, 1926.
6. Starkenstein, E.: Deutsche Med. Wchnschr., 52:1034 (June 26) 1926.
7. Correspondence, J.A.M.A., 80:942 (March 31) 1923.
8. Uses and Abuses of Barbitals, J.A.D.A., 18:152-55 (Jan.) 1931.

regard to individual conditions—a practice, especially in the case of analgesic and hypnotic drugs, that is reprehensible. In the case of mixtures of this kind, the necessity for individual dosage is again illustrated by the work of Koppanyi and Liebersen, working in the Cornell University Medical College pharmacologic laboratory. These workers experimented with barbital and amidopyrine. They reasoned that when analgesic and hypnotic agents were used together, the dosage of the analgesic must be repeated when the analgesic action ceased, since, in general, they were eliminated more promptly than hypnotics, particularly those of the barbituric acid series. They found by experiment that which is well known—that the rates of elimination of the two types of compounds were different, the analgesic being eliminated by way of the urine more promptly than the hypnotic. They rightly concluded from their experiments that when an analgesic and a hypnotic are administered for a therapeutic effect, they should be given separately as frequently as necessary.[9]

It was stated above that the Council agrees that hypnotics may augment the action of analgesics, and that the prescribing of such agents should be as far as possible based on individual requirements. In general, when it is desired to use these two classes of drugs together, the following procedure may be suggested:

Barbital, 0.2 gm. (3 grains) and acetylsalicylic acid or amidopyrine, 0.2 gm. (3 grains) are given at once. They should not be given more often than once in eight hours. Should the pain continue or reappear after three hours, 0.2 gm. (3 grains) of acetylsalicylic acid or amidopyrine may be given alone. The effect of a single dose of amidopyrine is said to last twenty-four hours and the dose should not be repeated frequently. Acetylsalicylic acid may be given in doses of 0.3 gm. (5 grains) at intervals of four hours should it be necessary to relieve pain.

Frequent repetition of barbital or one of its derivatives may cause drowsiness in the daytime. A simple analgesic—acetylsalicylic acid or amidopyrine—may be used when pain reappears in the intervals. Certan forms of intense pain require an occasional dose of morphine, but one can relieve intense pain with less morphine if one uses the analgesic mixture at the same time or on the reappearance of pain.[10]

Schering & Glatz have not shown by carefully controlled clinical tests of record that a mixture of barbital and amidopyrine is more efficacious than any of the analgesics alone for the conditions for which they are recommended in dental practice.

Where an analgesic action is desired, proper dosage of any of the following drugs official in the United States Pharmacopeia may be all that is required: acetanilid, acetphenetidin, acetylsalicylic acid and amidopyrine. This, of course, takes no account of the great difference in cost between Peralga and certain analgesics.

(According to a catalog of a surgical supply house, readily available analgesics may be purchased at the following cost: 1,000 6-grain tablets of Peralga, $52.50; 1,000 5-grain tablets of barbital, $15.60; 1,000 3-grain tablets of acetanilid, $2.10; 1,000 5-grain tablets of acetphenetidin, $8.00; 1,000 5-grain tablets of amidopyrine, $9.30; 1,000 5-grain tablets of acetylsalicylic acid, $1.50.)

Pharmaceutic agents possessing analgesic and hypnotic properties are useful in dentistry provided they are not misused. One of the most frequent uses of analgesics in dentistry arises from that condition commonly associated with preoperative anxiety, to mention only one. Such a condition is generally not analyzable, and the advertisers of Peralga, as well as other advertisers of similar mixtures, play on this. The difficulty of analyzing this condition may be seen by an analogy which, in a sense, presents a more clear-cut case. A patient, for example, who has lost sleep and is nervous and irritable complains of intense pain at one time, and on another occasion the same patient bears a

9. Koppanyi, T., and Lieberson, A.: J. Pharm. & Exper. Ther., 39:177 (June) 1930.
10. Queries and Minor Notes, J.A.M.A., 93:714 (Aug. 31) 1929.

similar pain with little complaint. In other words, there are so many factors in pain and its relief that it is difficult to make comparisons of the analgesic properties of two substances which differ but little quantitatively. How much more difficult then is it to analyze preoperative apprehension?

The Council readily admits that, when properly used, hypnotics of the barbital series are useful in connection with local and general anesthesia; but, in this case, proper doses of the hypnotic alone should be used, because analgesic drugs, such as amidopyrine, are not known to have this action, and, as mentioned in an earlier Council report, barbital fulfils all requirements.[8]

When a mixture like that present in Peralga is prescribed, the practitioner may unwittingly prescribe a hypnotic where an analgesic alone is intended, or *vice versa,* when the hypnotic or sedative action would not necessarily be obtained. No great harm may be done to a patient when such a fixed combination is prescribed once or twice, unless there is an idiosyncrasy to one or the other of the components; but if the mixture is prescribed or used over a long period of time for the relief of pain, toxic symptoms may, and frequently do, arise. The practitioner should appreciate that the method of marketing Peralga, whereby it can be obtained without a prescription, is open to abuses which he cannot condone or overlook.

(Since this report was prepared and sent to the firm, reports have appeared in the literature on the supposed relation between the ingestion of amidopyrine and amidopyrine-barbiturate combinations and agranulocytic angina.)[11]

ALLONAL—NOT ACCEPTABLE FOR A.D.R.

The report on Allonal was sent to Hoffman-LaRoche, Inc., Nutley, N. J. E. H. Bobst, writing for the firm, sent a letter, which is published below, as requested. This letter will serve for further enlightenment of the dental profession.

It is true that neither Allonal nor any other Roche product has been submitted to the Council. The facts are that the Council undertook an examination of Allonal for the benefit of the dental profession and the public it serves and because of the methods employed in its marketing. As Hoffman-LaRoche has brought forward no scientific evidence, and it is on scientific evidence that the Council's report was based, there was no reason for a revision of the Council's conclusions.

Evidence that the medical profession, as represented by the Council on Pharmacy and Chemistry of the American Medical Association, condemns some of the methods used by Hoffman-LaRoche is seen in the refusal to accept some of its products; namely, Sedormid, Allonal, Sedobrol, Pantopon and Tonikum-Roche. The reports of these products have been published in the *Journal of the American Medical Association.*

In spite of all this, the house of Roche is not in question. The Council is aware that certain of the Hoffman-LaRoche products are acceptable to the investigating body of the A.M.A., but the spokesman for the manufacturers does not hesitate to resort to a specious form of argument to distract attention from the issues involved, a form of debate which the Council cannot resort to. Consequently, the Council voted to authorize publication of the following report.

SAMUEL M. GORDON, *Secretary*

Allonal is marketed in tablets by Hoffman-LaRoche Chemical Works. According to the best available evidence, Allonal is a mixture, or, at best, a loose, unstable chemical

11. Madison, F. W., and Squier, T. L.: Etiology of Primary Granulocytopenia (Agranulocytic Angina), J.A.M.A., 102:755 (March 10) 1934.

combination of allylisopropylbarbituric acid and amidopyrine.[1] Each tablet, according to the labels, contains 0.126 gm. allylisopropylbarbituric acid phenyl-dimethyl-diemethylamino pyrazalon plus 0.034 gm. phenyl-dimethyl-dimethylamino pyrazalon. A statement of composition does not appear in many advertising circulars examined by the Council. In these respects, it is similar to at least half a dozen products, exploited especially in Europe.

After a careful comparison of the advertising literature being sent to dentists today, and the report of the Council on Pharmacy and Chemistry[2] of six years ago, the Council finds that the situation regarding Allonal is unchanged. The original claims for the product remain essentially the same. For instance, it is still said to be a chemical compound, to be a greater hypnotic, and less toxic, than others. The claims of usefulness and superiority are unsupported by evidence that may be considered adequate. The circular letters and the pamphlets are clothed in irresponsible language with appeals to credulity and to medication without diagnosis. There are wholly irresponsible and inconsistent claims of utility in hospitals and usefulness to the medical profession in general, and of substitution for well-established and useful narcotic drugs. The claims are repeated time and again in a steady stream of pamphlets and of circular letters addressed to dentists and to physicians.

A number of examples, with comments, will illustrate the character of the assertions being emphasized to dentists: "This hypnotic was chemically combined with an analgetic substance, amidopyrine, in the knowledge that through synergism, the actions of the two compounds would be greatly enhanced." A clear exposition of the general properties of Allonal as a mixture, and the reasons that it would do no good even if allyl-isopropyl barbituric acid and amidopyrine were chemically combined, are given in the report of the Council on Pharmacy and Chemistry, published in 1926. No convincing evidence of the necessity or desirability of such chemical combination in order to obtain the actions of those drugs is to be found anywhere. There is, therefore, no reason to believe that Allonal acts otherwise than as a mixture whose components, namely, allyl-isopropylbarbital and amidopyrine, act individually in the body. Furthermore, the use and prescribing of Allonal is unnecessary, since the two drugs can be obtained and prescribed separately, if their actions are desired. The use of the official barbital and amidopyrine (U.S.P.) would be more economical than the use of Allonal.

There are good reasons that mixtures of hypnotic and analgesic drugs, such as allyl-isopropylbarbituric acid and amidopyrine, should not be used. Pharmacologic experimentation (the work of S. Loewe and others)[3] has demonstrated that such drugs, acting at the same time, whether given together in mixtures or separately, increase one another's action, as indicated by increased toxic and fatal effects in animals. Such active combinations are, therefore, potentially dangerous. The fate of the two drugs in the body is not the same: one may be excreted or destroyed more readily than the other, and ultimately the action of the cumulative drug predominates. Such cumulative action would tend to increase the action of the other drug in succeeding administrations, unless the latter are interrupted sufficiently. Hence, such claims as are illustrated by the following passages in the advertising circulars are erroneous and misleading, being based on unproven assumptions that the two drugs in Allonal act steadily and safely together in the body as a single entity, or in the same ratio as in the original mixture: "Safety and therapeutic value of Allonal are well proven." "Combined effect of sedation and pain relief." "A safe, sound, scientific remedy evolved for pain relief and sleep." "A sedative, analgesic and hypnotic, which is not habit-forming and is not depressing to heart, circulation and

1. Queries and Minor Notes, J.A.M.A., 82:1066 (March 29) 1924.
2. Report of the Council on Pharmacy and Chemistry, J.A.M.A., 86:1853 (June 12) 1926.
3. Rentz, E.: Arch. internat. de pharmacodynam. et de therap., 43:337 (review) 1932.

respiration." "To be certain that you are employing the best and safest remedy for insomnia, pain and nervousness use the non-narcotic Allonal." "Allonal is by far the quickest non-narcotic remedy, and the safest therapeutically, for producing sleep and alleviating pain."

Another side to the wholly untenable position assumed for the utility of Allonal is the advocacy of two potent drugs together for patient or complaint regardless of necessity; that is, use of Allonal forces unnecessary and undesirable medication, since an analgesic must be taken with a hypnotic drug when only the latter may be indicated, or *vice versa.* The potentiated action would expose the patient to unnecessary hazard.

Although the claims for usefulness of Allonal center around an analgesic action, the hypnotic action is by no means overlooked, for *"Allonal is without doubt the best non-narcotic hypnotic."* But since the introduction by the same firm of Alurate, which is stated to be allyl-isopropylbarbituric acid, the hypnotic constituent of Allonal, the dentist reads in the recent advertising literature on Alurate: ". . . for unqualifiedly, we believe Alurate 'Roche' is the best hypnotic." Therefore, why Allonal? Or is sales resistance to Allonal being met by exploiting Alurate in equally meaningless superlatives? From numerous published researches on barbitals, the fact is, of course, that any one of more than a dozen barbiturates will cause the same kind of hypnotic and toxic actions. All are useful, the results varying with dosage, method of administration and condition of the patient. Finally, the claims of usefulness of Allonal "for nervousness before operation," "to offset the by-effects of procaine," are the same as for barbital (U.S.P.) and other barbitals used alone.

Extravagant and irresponsible are the claims for Allonal as an analgesic for general use and as a substitute for opiates: "The accepted non-narcotic remedy for controlling pain and inducing sleep." "Allonal stands out as a thoroughly rational and scientific anodyne." "An accepted non-narcotic agent for establishing a certain immunity to pain, giving general pain relief. . . ." "In medicine, Allonal is being successfully used in a wide range of conditions, from simplest headache to the pains of carcinoma." "Allonal passed the experimental stage long ago." "It is accepted by dentists, physicians and surgeons and is generally acclaimed the best non-narcotic remedy available." "Need we tell you that Allonal is more widely employed by the medical profession than any other non-narcotic remedy of its type?" "You can find Allonal in practically every medical institution in the United States being routinely used against pain, nervousness and insomnia." "Do you realize how widely it is being used in place of opiates and older hypnotics?" "Allonal resembles morphine and codein." "Allonal is successfully replacing morphine and other narcotics in relief of cancer pains, and pains of equal severity in incurable diseases." "Why is Allonal prescribed almost universally in place of opiates?" It is scarcely conceivable that any practitioner with average experience and judgment would be impressed with such wholesale disregard for the truth.

In a similar vein, calculated to impress the naive and credulous, and to appeal to the hesitating dentist, are the following passages in an advertising circular on Allonal: "Allonal was produced after long research in the Roche Scientific Laboratories," not mentioning several existing mixtures similar in composition to Allonal. "A valuable drug widely prescribed by the medical and dental professions in private practice and used routinely in practically every hospital in the country." Wide geographic distribution of free samples to practitioners and hospitals is apparently assumed to be the equivalent of general therapeutic usage.

According to statements in the advertising, there seems to have been a proclamation in a dental publication announcing the special dental usefulness of Allonal. However, the dental claims in the advertising circulars are listed together with claims of usefulness in unrelated conditions. The specific dental claims are the same as for barbitals in general,

such as for preoperative medication for calming the patient, reducing reactions to local anesthetics, postoperative-pain control, as a postoperative hypnotic, and for toothache. "Dental pains. One tablet will stop most toothaches readily." "Our many dental friends are using Allonal routinely not only in extractions, but in all operative procedures. In fact, the indications for Allonal in dentistry are daily becoming more numerous as the therapeutics of this non-narcotic remedy become better known." "It possesses triple action. Besides quieting the nerves and alleviating pain it induces refreshing sleep." All this smacks of the "cure-all."

Widespread usage is advocated in at least seventeen dentally unrelated conditions mentioned in the circulars sent to dentists. It is claimed that "Allonal 'Roche' is especially indicated and highly serviceable in these conditions: insomnia, nervousness, excitation, dysmenorrhea, menopausal psychoses, alcoholism, sea-sickness, headache, migraine, neuralgia, neuritis, sciatica, arthritis, hiccough, all acute and chronic pain, vomiting of pregnancy, drug addiction." "Nervous excitation in any form." "Pain of any type. . . ." ". . . headaches, colics, acute indigestion, rheumatism—even the more violent pains such as from carcinoma or tabes." "Menopause." Thus, Allonal out-cure-alls all "cure-alls." And how familiar rings the appeal to self-medication without diagnosis!

What is to be thought of the method of exploitation practiced by Hoffman-LaRoche in the face of statements in the firm's circular letter of October, 1931, to dentists, in which, after ridiculing and belittling "cure-all" mixtures and methods of exploiting dentists by flooding them with samples, the firm's method of exploitation and distribution is precisely that? It is claimed further that Allonal is ethically advertised solely to the medical and the dental profession, with no indications in advertisements of usefulness to patient, and that Allonal is used by the thousands in every hospital, but not one "patent cure-all." Of course, the sale to the public is mediated through the practitioners, who act unwittingly as agents and assume the responsibility of distributing the product.

In conclusion, the Council finds Allonal not acceptable since the claims for it are unscientific, uncritical, exaggerated and misleading. Its use is unwarranted and unsafe. There is no evidence of its action in the body as a chemical compound; nor is it novel as to the plan of combining the actions of hypnotic and analgesic drugs. The use of combinations or mixtures of drugs, in fixed proportion, is undesirable, since it is known that the fate in the body of drugs in such fixed combination is not uniform and the constituents increase one another's toxic and fatal effects. Such combinations have been exploited from time to time for years, but each in its time has suffered a merited eclipse, and Allonal may prove to be no exception to the rule. Distribution of advertising literature of the character of that of Allonal to the dental profession in large volume constitutes an unmitigated abuse, since it appeals to ignorance and credulity and encourages self-medication without diagnosis in a large number of dentally unrelated complaints. As to commercial exploitation of the public by the familiar method of indirect action, through the practitioner, the Council, speaking for the dental profession, advises that it cannot assume the responsibility for such unwarranted and irresponsible practice.

The reply of the firm follows:

As a rule it is unwise to reply to a scurrilous attack such as the one which we received from you bearing the date of January 31st, but in this instance we feel impelled to do so.

Why is it, may we ask, that your referee, whose report clearly indicates that he has little knowledge of the barbiturates, should so unwarrantedly and in such malicious fashion direct his venom against Allonal, a remedy which many medical authorities have reported to be a valuable contribution to therapeutics? Why such vilifications directed against the House of Roche whose good reputation has been justly earned through the years by scientific research, by the well-known high quality of its products and by the ethical manner in which they have been introduced to the profession? Can it be because the still rather unknown Council on Dental Therapeutics is desirous of gaining a reputation cheaply by a vicious, unfounded attack

against a company of outstanding reputation? Is it, perchance, because the House of Roche has not yet seen fit to stand on your doorstep with hat off, begging for admittance, so that your official halo may be put around its product? We can hardly conceive that it could be due to the fact that we have not sought to be placed in what you might consider a favorable position of being allowed to spend as much of our money as we like in purchasing advertising space in your Journal. So far, you must admit, neither Allonal nor any other Roche product has been submitted to you for acceptance, nor have we approached you for your advice.

We have no further reply to make to the referee's report as far as his attack on Allonal and our reputation is concerned. We do not need to defend either; for we are well known to our medical and dental friends who are so numerous. Their esteem for us will hardly be lessened by your unjust and bitter attack. They may, however, join heartily with us in protesting against the veiled inference in the referee's report that members of the dental profession are "naive," "credulous" and "ignorant." It is your privilege to publish this letter with the Council's report. If you do not wish to publish it with the report, we may decide to do so ourselves.

(End of Letter)

ANNUAL MEETING OF THE COUNCIL ON DENTAL THERAPEUTICS

It is an established principle of the Council on Dental Therapeutics to advise the members of the dental profession and the public of its decisions as soon as circumstances permit. In accordance with this established principle, the following items discussed during the last meeting of the Council, which may be of interest to both dentists and manufacturers, are authorized for publication.

SAMUEL M. GORDON, *Secretary*

The Council on Dental Therapeutics of the American Dental Association held its fifth annual meeting at the Central Office, 212 East Superior St., Chicago, Friday and Saturday, April 20 and 21, 1934. The following members were in attendance: J. Howard Brown, Ph.D., Sc.D., associate professor of bacteriology, Johns Hopkins University, Baltimore, Md.; Paul J. Hanzlik, M.D., vice-chairman of the Council, professor of pharmacology, Stanford University School of Medicine, San Francisco, Calif.; Thomas J. Hill, D.D.S., professor of clinical oral pathology and therapeutics, Western Reserve University School of Dentistry, Cleveland, Ohio; Arno B. Luckhardt, Ph.D., M.D., LL.D., Sc.D., professor of physiology, University of Chicago, Chicago, Ill.; John A. Marshall, Ph.D., D.D.S., professor of dental pathology and biochemistry, University of California, College of Dentistry, San Francisco, Calif.; Victor C. Myers, Ph.D., Sc.D., professor of biochemistry, Western Reserve University, Schools of Medicine and Dentistry, Cleveland, Ohio; U. Garfield Rickert, M.A., D.D.S., professor of materia medica and therapeutics and hygiene, University of Michigan School of Dentistry, Ann Arbor, Mich.; Harold S. Smith, D.D.S., chairman of the Council, 180 North Michigan Ave., Chicago, Ill.; Samuel M. Gordon, Ph.D., secretary of the Council, chief, A.D.A. Bureau of Chemistry, Chicago, Ill.; C. N. Johnson, D.D.S., LL.D., Editor, JOURNAL OF THE AMERICAN DENTAL ASSOCIATION, Chicago, Ill., ex-officio member; Harry B. Pinney, D.D.S., Secretary, American Dental Association, Chicago, Ill., ex-officio member.

Thomas L. Grisamore, Illinois Trustee of the American Dental Association, and Newton G. Thomas, Associate Editor of THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION, were present on invitation.

Harold S. Smith and Paul J. Hanzlik were reelected, respectively, chairman and vice-chairman of the Council.

The members of the Council were particularly appreciative of the excellent service

accorded the Council and the dental profession by the chairman of the Council, Dr. Smith. This appreciation was particularly noted in his able handling of several situations in which attempts were made to misrepresent the position of the Council and some of its individual members before the dental profession.

STATUS OF THE COUNCIL

The Council was organized through a resolution at the Washington meeting. Its status in the American Dental Association was uncertain since it was not known whether the Council was a special, a temporary or a standing committee. This uncertainty was removed by the action of the 1933 meeting of the House of Delegates, at which the By-laws were amended to constitute the Council on Dental Therapeutics a standing committee of the Association. (*Transactions of the Seventy-Fifth Annual Session,* Chicago, 1933, p. 365.) This further emphasizes, in the opinion of the Council, the fact that the members of the Association desire a continuously functioning body to protect their interests in the field in which the Council is engaged.

Half of the members of the Council are nondental members. The constitution of the Association was so amended that persons possessing special knowledge who are not members of the Association may be appointed to serve on certain committees. (*Transactions of the Seventy-Fifth Annual Session,* Chicago, 1933, p. 364.)

DENTIFRICES

The discussion on the consideration of dentifrices, which occupied much of the Council's time, centered around several points: (1) the adoption of a more rigid definition of a dentifrice, in order to more clearly define the Council's position on this class of products; (2) the requirement that accepted dentifrices be tested for abrasiveness if they contain such an agent, although the Council will not at this time specify the particular test method and the conclusions that may be reached as applied to the teeth; (3) the necessity for prompt publicity on the findings of the Council, and the necessity, in order to make progress in this field, of prompt publication of reports on dentifrices which are being marketed in an unacceptable and essentially dishonest manner; (4) the circumstance that definite evidence concerning the claimed therapeutic properties of dentifrices was not available.

The following report sets forth the present position of the Council on consideration of this class of products:

In an earlier day, when dental science was less advanced than it is today, certain dentists believed that dentifrices could serve as a form of medication in preventing or overcoming disease of the hard and soft structures of the mouth. Continued experience, coupled with more careful observation, has led to the abandonment of this position. Prior to the formation of the Council, in 1930, it was recognized clearly that a dentifrice was solely an aid to the toothbrush in cleaning the teeth, and the proper kind of brush and its correct use were the more important factor in the daily mechanical hygiene of the mouth. (Home Care of the Mouth [American Academy of Periodontology, 1928], THE JOURNAL, 15:1366 [July] 1928.) Despite this sound position, most national advertisers of dentifrices advertised their wares with claims smacking of the worst element of the "patent" medicine industry. Thus, there came into prominence such undignified and essentially untruthful slogans as "four out of five," "the dentist's dentifrice," "the film removing toothpaste," "the danger line," "more than a dentifrice," "corrects acid mouth," "overcomes pyorrhea," "prevents pink tooth brush," "stimulates the flow of saliva," "do as your dentist does" and so on, ad nauseam. (Forhan's For the Gums—Not Acceptable for A.D.R., THE JOURNAL, 18:548-552 [March] 1931.) The possible importance of the dentifrice was, on the whole, overlooked, and, consequently, these products were sold with little or no attempt to secure adequate evidence as to the relative abrasive and

cleansing properties. From time to time, exceptions appeared. A few of the nationally advertised dentifrices were presented with some regard to truth. Such advertising, appearing in lay periodicals and, as frequently, in dental publications, naturally confused both dentist and patient. It was a consideration of these facts that prompted the Council in 1930 to agree to undertake the formulation of conditions under which the acceptability of dentifrices could be determined. These provisions, which follow, were prepared with an appreciation of the immediate situation it was designed to correct; namely, the false and misleading advertising situation, and to encourage those in the industry who desired to advertise honestly.

Dentifrices (with special reference to those advertised to the public) may be accepted for inclusion in the list of Accepted Dental Remedies provided: claims are strictly limited to their efficacy as an aid in the hygiene of the oral cavity and particularly to their mechanical cleansing properties; no therapeutic, chemical or bacteriologic claims are made or inferred in their exploitation; therapeutically suggestive names are not used as a brand name; the brand name is not indicative of a component which does not possess proven therapeutic properties or other inferred properties implied in the name, and there is no conflict with the Rules of the Council. The provisions in reference to proprietary names will not be retroactive. (Official Rules of the Council on Dental Therapeutics.)

The Council appreciated that it would be surprising if an industry built upon false and misleading advertising appeals were willing to accept even such liberal provisions as announced by the Council. In this respect, the Council has not been disappointed. This has meant that competition between manufacturers has been based on an attempt to outdo one another in catchy and false slogans, rather than on an effort to prepare products based on investigations regarding the merits of the competitive products.

In 1930, the Council realized that unless it took an extremely conservative position regarding the existing situation in the naming of this class of cosmetics, more than half of the widely advertised dentifrices would not have been eligible to be considered for acceptance on this basis alone. Hence, in its original position, the Council provided that the provisions in regard to proprietary names would not be retroactive. In reviewing this position from time to time, the Council felt that it could not establish as a permanent policy the acceptance of catchy and misleading trade names for this class of products. Hence, in 1932, the Council announced that it would not consider for admission to Accepted Dental Remedies those dentifrices put on the market after the formation of the Council unless such products were designated as "So-and-So's Tooth Powder" or "So-and So's Tooth Paste"; nor could it admit to A.D.R., under any conditions, a dentifrice which had as part of the name the titles, "Doctor," "D.D.S.," "D.M.D." or similar appellations. The more detailed view concerning this aspect was presented in the annual report of the Council for 1932. (THE JOURNAL, 19:2031 [Nov.] 1932.) The rationality of this position is obvious in view of the ease and readiness with which most dentifrices are prepared.

In reviewing the dentifrice situation at its fifth annual meeting April 20 and 21, 1934, the Council noted that although the advertising for the nationally advertised brands of this class of products still adheres to humbuggery and untruthfulness, improvement cannot be expected until these advertisers are more amenable to moral suasion or until national legislation to control this hokum is passed and enforced. Such control can be effective only when it prevents the spread of untruthfulness, not only that in print but also that broadcast over the radio.

Advances along other lines of the dentifrice problem have occurred:

1. There is now available a definition of the limited functions of a dentifrice based on the best available evidence: Dentifrices are products, generally mixtures, used locally on the teeth in conjunction with a toothbrush, without demonstrated medicinal, prophylactic or curative virtues. A dentifrice should not contain harmful or objectionable ingredients.

2. There is available in Accepted Dental Remedies a list of dentifrices of known composition and advertised with due regard to their usefulness. Those listed in Accepted Dental Remedies comprise dentifrices with either acid or alkaline reaction; with or without soap, and those completely soluble. Such frank statements of composition enable the dentist to guard the patient against certain ingredients which may give rise to allergic phenomena, such as that produced by orris root, or potentially nephrotoxic or hemotoxic agents.

3. From the data published in Accepted Dental Remedies, the dentist is in a position to evaluate the claims made for dentifrices.

4. A start has been made in defining the chemical and physical properties of the insoluble materials that go into the compounding of dentifrices.

5. Certain procurement agencies of the Government will not accept bids for dentifrices unless they stand acceptable to the Council.

6. The Council has taken steps to rationalize the naming of this group of products by not accepting newer dentifrices with tricky trade names until that product is labeled "So-and-So's Dentifrice."

While the Council will continue to consider dentifrices for admission to A.D.R., on the basis of its present position, it recommends that manufacturers of dentifrices undertake investigation, hitherto lacking, to determine the relative abrasive and cleansing properties of the basic insoluble ingredients and the finished dentifrices containing them, and that dentists insist on this information in definite form, that the teeth of their patients may be guarded against the undue abrasiveness of certain advertised dentifrices. Beginning twelve months after the publication of this notice, no dentifrice containing a so-called abrasive or polishing agent will be accepted for, or retained in, Accepted Dental Remedies, unless a statement of the physical properties of the insoluble abrasive material and the finished product and tests for determining them are made available. The Council will not at this time specify a particular test method, but may undertake to do so when more information is available.

Colgate's Ribbon Dental Cream: The Council considered the present status of Colgate's Ribbon Dental Cream, with special reference to the current claims for the removal of seven kinds of stains in its advertising. A report objecting to the present advertising theme was adopted and sent to the firm in accordance with the custom of the Council, in order to give the firm an opportunity to correct their advertising in the light of the Council's position. The full report will be presented at another time.

Specifications for Dentifrices: Elsewhere in this report it has been stated that certain Government procurement agencies will not open bids on the purchase of dentifrices unless such dentifrices were acceptable to the Council on Dental Therapeutics on the date on which these bids were opened. From correspondence sent to the Council by one of these agencies, it was apparent that pressure was being brought on these governmental agencies by various trade agencies with a view to easing the requirements, presumably not in the interest of the public, the profession or the Government, but the interests affected by the position of the Council. It was represented to these officers of the Government that certain dentifrices are not acceptable to the Council merely because of "ethical considerations." This, in fact, is a misrepresentation of the Council's position, for the Council considers not only the advertising, but also the product in arriving at a decision on it. In view of these circumstances, the secretary of the Council was directed to advise this agency of the Government that the Council could not, at this time, in the interest of the profession, the public and the Government, recede from its present position on dentifrices.

Subsequent to the Council meeting. further correspondence was received on the same topic. This correspondence suggested certain tentative specifications for dentifrices for

purchase by this agency of the Government. After a study of these specifications, it was pointed out that the proposed specifications were harder on the trade and were illogical in the light of available evidence, and that definite specifications would have been available if the information on dentifrices was of such a nature as to permit the formulation of useful, fair and logical specifications. Specifications which have no basis in fact are worse than none.

Cleansing Action of Tooth Pastes: It has been assumed that dentifrices clean the teeth, although it is difficult to obtain conclusive evidence on this point. The desirability of such information is evident, since eventually the dental profession must decide on the basis of available evidence or other appropriate means what a "clean mouth" is; for on such a definition depends an evaluation of the ultimate usefulness of dentifrices. Several suggestions were made: One that groups of dental students or dentists might be induced to examine one another's mouths according to some "standard." The South Bend Dental Society rendered a useful service to the dental profession and the public by furnishing the Council the results of a series of tests which they had made on the "three shades whiter in three days" slogan of the Kolynos Company. By a direct series of tests on patients, they were able to explode this misleading advertising.

Dentifrice Formulas: From time to time, requests have come to the Council for formulas on dentifrices. These inquiries were generally answered by referring to simple formulas in well-known textbooks. The Council does not look favorably on the suggestion that it develop standard dentifrice formulas for the general use of the dental profession and the public, since it cannot undertake to write formulas for something upon which there is little material, and because of its feeling that, in the last analysis, the composition of a dentifrice or any other medicinal agent suggested to a patient must remain an individual matter between the patient and the dentist. However, the Council feels the desirability of the preparation of an article on the use of the toothbrush and the dentifrice by someone acquainted with the field.

CONSIDERATION OF MECHANICAL APPLIANCES

From time to time, inquiries come to the Council from manufacturers concerning the possibility of acceptance by the Council of articles such as toothbrushes, denture materials and apparatus for sterilization. The present position of the Council is not to consider these materials for acceptance or rejection. At times, some of these products are being sold to the profession and to the public with unwarranted therapeutic claims, which thus bring the product within the purview of the Council. Hence, the scope of the Council was revised so that the Council would not consider mechanical apparatus of this type for acceptance at this time, but would undertake discussion of these if they are advertised with therapeutic implications. In this respect, the Council has cooperated with the Council on Physical Therapy of the American Medical Association in evaluating the evidence and claims made for ultraviolet apparatus for the cure and control of dental diseases and conditions. This report appeared in the *Journal of the American Medical Association,* Jan. 13, 1934, page 135.

MOUTH WASHES AND ANTISEPTICS

The position of the Council as to mouthwashes was reviewed at some length in the report published. (THE JOURNAL, 19:1239-42 [July] 1932.) A member of the Council handling this class of products was asked to review the report in order to ascertain whether the position taken therein still holds. The member believed that the report of the Council adequately meets the present needs.

The question of mouth washes is quite different from that concerning legitimate use of antiseptics, germicides and related agents by members of the dental profession in the treatment of dental operative procedure. After thorough discussion of the subject it was

felt desirable to have two articles prepared for the series on pharmacology and therapeutics, on antiseptics and related preparations. One of these articles will relate to the use of germicides and related agents when they are applied to unbroken surfaces, and the second to the use of these agents for antiseptic or germicidal action on lacerated or broken tissues. Qualified persons working in this field will be invited to assist the Council in the preparation of these reports.

LOCAL ANESTHETIC SOLUTIONS

The member of the Council handling this class of products discussed in some detail current problems in respect to prepared local anesthetic solutions, several of which have been under consideration by the Council during the course of the year. The member pointed out that freshly prepared alkaline solutions of procaine increased anesthesia, when the anesthetic agent is confined to nerve tissues, and appears to yield better and more prompt anesthesia. There unfortunately is not a great deal of critically obtained data to show the difference of anesthetic power at various p_H (hydrogen ion) levels. The clinical data available, although far from fulfilling all the requirements of carefully controlled, scientific clinical data, do show a small difference in time of onset of anesthesia, but more data are needed before definite statements or fine discrimination can be made.

It is noted that the manufacturers of local anesthetic solutions do not refer to toxicity in the sense that the term is generally understood. The term toxicity is used in the sense of a postoperative disturbance, which is assumed to be synonymous with toxicity. Toxicity is defined, for example, in Dorland's Medical Dictionary, Fifteenth Edition, as "the quality of being poisonous, especially the degree of virulence of a toxic microbe or of a poison." The definition continues: "It is expressed by a fraction indicating the ratio between the smallest amount that will cause an animal's death and the weight of that animal."

It has been pointed out in the past that many manufacturers of these solutions use the term "Ringer's solution" incorrectly and thus mislead the profession.

Although there appears to be small difference between the acid and alkaline solutions, under practical conditions more data from more diverse sources are needed to show that the alkalinity or acidity of the solution is a factor of major importance.

For those who desire to use local anesthetic solutions, the problem is readily resolved in several ways: by dissolving procaine borate in water, previously made sterile, or by dissolving tablets of procaine hydrochloride in appropriate alkaline mediums, such as sodium bicarbonate, sodium carbonate or disodium phosphate. A practical method for carrying this out has been suggested by Charles W. Freeman, of Northwestern University Dental School (Stock Solutions and Mixtures for Local Anesthesia, Reports of the Council, THE JOURNAL, 19:1046-1051 [June] 1932). Procaine borate contains, per unit, less of the procaine base, which is the effective agent. Hence, from this point of view, anesthesia may be considered more effective.

Stock solutions of strongly acid or strongly alkaline local anesthetics are not entirely desirable, since they are potentially unstable or unduly irritating. The Council appreciates that the dentist will meet with difficulty in evaluating these solutions merely on the basis of their alkalinity or acidity, unless the alkalinity or acidity is known at the time the solution is used. Furthermore, the critical point between acidity and alkalinity has not yet been demonstrated, although claims in this respect have been allowed by the patent office. The confirmation of these claims will be a matter of interest.

In the case of both ready-made acid and alkaline solutions, manufacturers have tried to obviate the decomposition of epinephrine or related substances by the addition of bisulphites. For this reason, it is thought desirable by the Council to have an expiration date on the package, but this has not been pressed in the consideration of those products submitted to the Council by the manufacturer. The Council feels that in view of the cooperation of the manufacturer and the manufacturing considerations involved, some time

may elapse before this is made obligatory. But the exact keeping qualities of the preparations with respect to epinephrine, sodium bisulphite and physical properties ought to be determined by experimentation; something which the manufacturers apparently have not done in a very satisfactory manner. It is obvious that it will be to the advantage of the dentist and his patient when the claims advanced are based on adequate and acceptable data.

Bisulphite has been used by the manufacturers to prevent the discoloration of epinephrine, but it has never been sufficiently investigated from the standpoint of its effect on tissues locally. In considering these products for acceptance, it has been felt that as long as there is no recorded evidence regarding the effects of bisulphites on tissue and on the solutions, they might be provisionally accepted, provided their presence, like that of other ingredients, is declared. This will encourage the manufacturers to develop data along these lines. If, in the meantime, evidence should come to hand which would cause a revision of this action of the Council, appropriate measures will be taken.

VITAMIN PRODUCTS

A manufacturer of a fish liver oil, rich in vitamin A, sent to the Council an informal communication which, in part, referred to a paper by S. B. Wolbach and Percy R. Howe, which appeared in the *American Journal of Pathology*, May, 1933. This manufacturer requested the Council's opinion on the propriety of using the following conclusions from that article as a basis for the promotion of vitamin A-rich fish liver oil to the dental profession:

4. Defective enamel formation and other poorly understood conditions in teeth, such as denticles, pulp bones and cementicles, may reasonably be regarded in the human as vitamin A deficiency possibilities.

7. Our observations indicate that vitamin A deficiency is the most important of the known vitamin deficiencies in its effect upon tooth formation.

The Council's decision on this class of products was that it would continue to oppose the inclusion of products containing high concentrations of vitamin A without vitamin D for reasons already transmitted to the Council in connection with a similar product. These are:

The acceptance of a product which is solely a potent source of vitamin A or carotene must be preceded by the evidence that such a product free from vitamin D, or containing relatively small unitage, can with benefit be recommended generally to patients by dentists as a prophylactic measure against caries, or other dental conditions.

In the opinion of the council the administration of vitamin A or carotene in large doses, free from vitamin D, is a matter primarily for the physician. To illustrate the point, consider the harm which might be caused by the administration of vitamin A or its equivalent as the sole medicament to a child to remedy dental defects when the child in addition was bordering on rickets as a result of vitamin D deficiency.

The Council does not wish to detract from the evident necessity for vitamin A in the diet. On the contrary, the Council has emphasized the desirability of including all factors known to contribute to normal growth and maintenance of the individual. However, the statement " . . . the need of these higher requirements of vitamin A . . . for the development of strong teeth . . . " implies that the vitamin A requirement is not ordinarily adequately supplied by a suitable choice of common foodstuffs. Evidence for this appears to be lacking, and as far as the referee is concerned, treatment of cases which might appear to require addition of vitamin A alone to the diet should be based on the general examination of the patient such as the physician is prepared to give.

The fact that dental defects in animals result from a deficiency of vitamin A has been demonstrated. It has not been shown that vitamin A concentrates free from vitamin D can with benefit be prescribed generally as an adjunct to what is considered a well chosen diet or that, in special cases such as those of deficiency of vitamin D, this procedure would be devoid of possible harm. The dentist has no way of knowing whether the latter condition prevails,

The manufacturers no doubt wish to promote the use of high vitamin A preparations to the dentists and their patients in the expectation that the concentrates will cure or arrest caries. This is more than the experimental work quoted was intended to show or imply.

The optimum amounts of vitamin A needed for adequate calcification are not known. The relation between vitamins A and D no doubt needs reinvestigation, but if there is any merit in testing on human patients the effect of large amounts of vitamin A without vitamin D, the work should first be carried out in a clinic where the result on the patient generally could be accurately observed.

In the meantime, for the use of dentists, products qualitatively similar to cod-liver oil or its concentrates should cover their requirements.

Dosage of Cod Liver Oil: The state of knowledge in reference to vitamins A, C and D and calcium and phosphorus in relation to the health of the teeth and the health of the gums is still in a state of flux. While it is assumed that calcium, phosphorus and vitamin D are important in this respect, there is no exact evidence as to the part they play while the teeth are being formed, prenatally, postnatally and after the teeth are fully formed. Knowledge in respect to vitamins A and C is even more unsatisfactory, despite the fact that certain newer assay methods for vitamin C are based on the influence of a vitamin C deficient diet on the pulp of the teeth.

The present edition of Accepted Dental Remedies lists several brands of cod liver oil. The exact dosage for prophylaxis against defective formation of teeth is not known; nor is there any exact dosage available as to the minimal or optimal dosages for the protection of teeth after they are fully formed. Hence, the dosages in Accepted Dental Remedies are those given in New and Nonofficial Remedies as prophylactic against rickets. The dosages in New and Nonofficial Remedies against rickets were determined from the answers to a questionnaire sent to recognized pediatricians.

At the present time, the U. S. Pharmacopeial Revision Committee is contemplating the issuance of a new set of standards for cod liver oil which will appear as a supplement to U. S. Pharmacopeia X. These standards call for a vitamin A unitage of at least 600 U.S.P. units of vitamin A in each gram, and at least 85 U.S.P. units of vitamin D; the units in each case being measured against standard preparations with known vitamin A and vitamin D effect. The unitage and the methods expressed in the present edition of Accepted Dental Remedies are various and were in accord with the stated knowledge at the time the chapter was written. It was felt that the chapter should not be wholly revised at the present time, but that reference should be made to the present U. S. Pharmacopeia requirements, which become official, Jan. 1, 1935. Thus, dentists who follow Accepted Dental Remedies will have available as a basis of comparison the old units and the new U. S. Pharmacopeia standards. For further information, the following taken from the *Journal of the American Medical Association,* April 21, 1934, is included:

The Pharmacopeia (U.S.P. X, Revised, 1934), besides giving tests for the purity of cod liver oil, also gives methods for the assay of its content of vitamin A and vitamin D; furthermore, it provides that the vitamin A potency and vitamin D potency of cod liver oil when designated shall be expressed in "United States Pharmacopeia units" per gram of oil and may be referred to as "U.S.P. units" per gram of oil. It is also stipulated that

"One United States Pharmacopeia unit of vitamin A is equal in growth promoting and antixerophthalmic activities for the rat to one international unit of vitamin A as defined and adopted by the Conference on Vitamin Standards of the Permanent Commission on Biological Standardization of the League of Nations in June of 1931; one United States Pharmacopeia unit of vitamin D is equal, in antirachitic potency for the rat, to one international unit of vitamin D as defined and adopted by the Conference on Vitamin Standards of the Permanent Commission on Biological Standardization of the League of Nations in June of 1931."

For purposes of information, it may be stated that the new U.S.P. unit of vitamin A is equivalent to 0.714 unit U.S.P. X (1925); and the new U.S.P. unit of vitamin D is equivalent to 3.26 A.D.M.A. units, or 0.370 so-called Steenbock units.

The Pharmacopeia (U.S.P. X, Revised, 1934) now specifies that cod liver oil must contain in each gram at least 600 U.S.P. units of vitamin A and at least 85 U.S.P. units of vitamin D. Cod liver oil may be flavored by the addition of not more than 1 per cent of any one or any mixture of flavoring substances recognized in this pharmacopeia.

Evidence has accumulated that it is feasible to market cod liver oil having a vitamin A potency much higher than the lower limit of the pharmacopeial product. Accordingly, all brands in New and Nonofficial Remedies are required to have a vitamin potency of at least 850 vitamin A units per gram and at least 85 vitamin D units per gram when tested by the U.S.P. X (Revised, 1934) method.

It has been shown that an effective concentrate of cod liver oil can be made and marketed. To be acceptable for inclusion in New and Nonofficial Remedies such a concentrate should have a vitamin A potency of at least 14,000 U.S.P. X (Revised, 1934) units per gram, or 1,100 U.S.P. X (Revised, 1934) units per tablet or other dosage unit and a vitamin D potency of at least 1,400 U.S.P. X (Revised, 1934) units per gram, or 110 U.S.P. X (Revised, 1934) units per tablet or other dosage unit.

The Council requires that the vitamin A and vitamin D potency of accepted brands of cod liver oil and cod liver oil concentrates be declared in U.S.P. X (Revised, 1934) units on the label of such products. Statements of the potency of tablet preparations of cod liver oil concentrate made on a "per tablet" basis and also on a "per gram of tablet" basis should appear in the firm's presentation and in New and Nonofficial Remedies. On the labels, however, a declaration of vitamin potency "per tablet" is sufficient.

The average daily dose of U.S.P. X (Revised, 1934) cod liver oil recommended by the U.S.P. Vitamin Advisory Board is as follows:

Average Daily Dose
Infants: 12 c.c. (3 fluidrachms)
Adults: 24 c.c. (6 fluidrachms)

The consensus of the replies to a questionnaire on the subject indicates that the figures given represent the prophylactic and curative dose when the new U.S.P. cod liver oil is used.

Claims Permissible for Vitamins A, C and D and Calcium and Phosphorus in Relation to the Teeth: In the course of the year, the Council receives numerous inquiries concerning the exploitation of mineral concentrates stated to contain calcium and phosphorus in proper amounts for the building of strong bones and teeth and healthy gums. The exploitation of orange juice as a panacea for caries and other dental conditions has been wide. The evidence is not imposing and needs confirmation. In order to acquaint the dental profession with its own position, the following general statement of the Council's position is given:

Diet is recognized as a contributory factor in the formation and maintenance of sound teeth. Various experiments on large groups of children in this country have demonstrated that no one single factor of those mentioned above is responsible for prophylaxis against or correction of caries, but that an adequate food intake containing all of these elements is essential.

These essentials are usually furnished by well-balanced diets. If the diet is deficient in any one of these essentials, it may be corrected by the addition of foodstuffs known to be a source of the missing essential. Reliable quantitative data are lacking as to the amounts of vitamins A, C and D or calcium and phosphorus needed at various growth levels.

It has not been demonstrated that the ingestion of inorganic or organic compounds of calcium and phosphorus *per se,* or accompanied by vitamins A, C or D, guards against or overcomes caries or disease of the soft structures, although it may be assumed on general grounds that these may be helpful as a prophylactic, but not as a curative, measure.

PATENT SITUATION

The Council for some time has been concerned about the granting of patents by the U. S. Patent Office for preparations which are exploited to the dental profession and to the public. A member of the Council was appointed to study the situation. The report

which follows was adopted by the Council, and is presented herewith for the information of the profession:

NEED FOR PATENT LAW REVISION

In 1918, the Committee on Patent Law Revision of the Council on Pharmacy and Chemistry of the American Medical Association, published a report under the caption "Need for Patent Law Revision" in the *Journal of the American Medical Association,* Jan. 12, 1918.

This Committee protested against the provisions of the patent law and the methods of its enforcement which permitted the granting of patents for medicinal products without thorough and scientific investigation of the claims advanced in such letters patent. They suggested, as a means of improving conditions, that the U. S. Public Health Service, the Bureau of Chemistry, U. S. Department of Agriculture and other scientific departments of the U. S. Government conversant with medicines and related preparations be consulted before the issuance of patents on this class of preparations.

Patents for chemical compounds already described in the literature, for the use of well-known chemical bodies which present no discovery or originality and patents for nostrums were granted. Such examples are being repeated over and over again in the granting of patents for dentifrice mixtures.

Patents No. 760,397 and No. 802,099 on the use of peroxides, perborates and percarbonates as ingredients of tooth powders, such as that under which the tooth powder "Calox" was manufactured for a number of years, brought the following comment: "The patents held by McKesson and Robbins give this firm the exclusive right of manufacturing tooth powders containing peroxides, perborates and percarbonates. It is another illustration of the unfair monopolies that may be secured under our present patent laws." (*J.A.M.A.,* Sept. 20, 1913.)

A patent was granted for flavored epsom salts, and here the *Journal of the American Medical Association* pertinently remarks:

> The splendid conception of the framers of our constitution in providing a plan for promoting progress in science and useful arts by granting to inventors for a limited time the exclusive use of their inventions, in exchange for the publication of full knowledge thereof, is being debased. No branch of our government is of greater importance to the progress of the country than the patent office, provided that office is intelligently administered. When the patent office is used, however, for an extension of the nostrum business, founded on the abuse of patent and trademark laws, it becomes a menace to the public health. The objects of the patent law are being defeated by the practice of the patent office. (*J.A.M.A.,* June 23, 1917, p. 1914.)

Similar patents of interest to the dental profession have been granted. This has forced itself on the attention of the Bureau of Chemistry and the Council in a number of instances only a few of which are mentioned:

Readers of THE JOURNAL will recall the report on "Semafor, the Wig-Wag System of Oral Hygiene" (THE JOURNAL, 15:2357 [Dec.] 1928) for detecting and correcting "acid mouth." Thus, a discovery was permitted on the utilization of the common and well-known indicator, phenolphthalein, to detect and correct a condition not recognized in dental science. A little careful investigation would have shown the misuse of the law by granting such a patent, for even in 1914 it was known that phenolphthalein and alkaline substances would not detect or correct supposed acid mouth.

Yet, some years later, a patent on a mixture said to yield a similar result was granted to John Oppie McCall, D.D.S., as a means to correct and detect mouth acidity. This consisted essentially of salt, ammonium carbonate, calcium oxide, Congo red and phenolphthalein. (Patent 1,717,723.) Dentists will remember this mixture as the one being sold under the name of Calsodent, and will recall that the Council pointed out the fact that there was no evidence of the ability of this mixture to do more than salt would do;

and, furthermore, the composition, less the indicators, was essentially the one accredited to Hermann Prinz, which has appeared in several textbooks and was widely quoted. (THE JOURNAL, 19:513-514 [March] 1932.)

To monopolies granted by patents for mixtures, which are essentially prescriptions, the dental profession each year pays tribute.

In 1932, patent 1,866,433 was issued to one A. W. Ward, D.D.S., for a mixture of zinc oxide and resin and a liquid of vegetable oil and eugenol. The Council pointed out that this was essentially a prescription, and it was apparent from the report that every dentist who wrote a prescription for this mixture, regardless of how often it had been used before, might be held liable for infringement of the patent law, if the holder of the patent choose to prosecute the case. (THE JOURNAL, 21:896, [May] 1934.) More pertinently, the holder of the patent threatened to institute proceedings against editors of dental journals who published the formula. This, it is readily understood, is contrary to the purpose for which a patent is granted, for in return for the monopoly of seventeen years granted to the holder of the patent, the patent law intends that the "discovery" or advance in the art shall be made known.

A product widely advertised to the dental profession under the name of Oleothesin is covered by patent 1,907,393. This was issued to Oscar H. Stover, M.D. Oleothesin is essentially a suspension of procaine base in olive oil and lanolin. Thus, the patent makes an old mixture a new discovery. The report of the Council on the product, not yet published, points out: "The increased penetrating power, through mucous membranes, and the solubility in oils and fat of procaine base, as compared with the hydrochloride, have been known since the work of O. Gros (in 1910) and verified by A. Laewen (1910; 1912) and Sollmann (1918.)"

In more recent times, patent 1,924,685 was issued for a solution of procaine hydrochloride and epinephrine in a solution essentially of sodium phosphate. This was issued on the claim that such a solution induced more prompt anesthesia because its alkalinity was above that of the critical p_H of blood, a term, incidentally, not recognized in the literature in reference to local anesthesia, and, even more fundamental, the patent permits the erroneous statement that common salt is a buffer, whereas any student of elementary chemistry should be aware that sodium chloride does not act as a buffer. The claims permitted practically preempt the field for the use of alkaline solutions of local anesthetics.

The claims on which the patent is based were published in pharmacologic literature as far back as 1910. The report of the Council on "Stock Solutions and Mixtures for Local Anesthesia" pointed out at that time that Oscar Gros has shown the onset of anesthesia by procaine to be related to the dissociation of the procaine salt; that is, the more readily hydrolized, the quicker the penetration of the free base into the tissue, with consequent more rapid onset of anesthesia. The application of these laboratory results in the clinic were reported about the same time. In 1918, Sollmann confirmed essentially the results of Gros' work (THE JOURNAL, 19:1046-51, [June] 1932) on solutions of procaine hydrochloride in disodium phosphate.

In 1933, the patent office allowed a monopoly on claims which are part and parcel of the scientific literature, and which are available to every dentist, if he wishes to use them. The holder of the patent may, if he wishes to exert his patent rights, prosecute anyone who writes a prescription for an alkaline solution of a local anesthetic.

In the by-gone days of dentistry, aqueous infusions of various plants had been applied to the gums for alleviation of certain pathologic conditions. Yet, in recent years, a patent for a medicinal infusion for treating gums, (1,927,610) was issued to one John A. McAllister. This patent related to an aqueous infusion of the leaves of western sage for pyorrhea. It may be stated with a fair degree of assurance that if similar claims were made on the label of a bottle of an aqueous infusion of western sage for pyorrhea, the

exploiter would be subject to prosecution, even under the weak Food and Drugs Act of 1906.

By the same token, cannot one expect to obtain a patent on green cheese for treating gums, since an inventor of the "discovery" could readily prove that, as far as the literature goes this has not been previously described?

It must, of course, be pointed out that the patent office disclaims any responsibility for the validity of claims made in the patents. A communication to the Commissioner of Patents, in which objections to the lack of evidence for certain claims allowed by the patent office were made, brought the response that after a patent is granted, the case is out of the hands of the patent office, and is a matter for the courts. But any fair juror would not presume to pass on the validity of therapeutic claims made for medical preparations, any more than any dentist would presume to pass on the fairness of points of law. This at once suggests the desirability of more adequate investigation regarding these products before the issuance of patents.

The Council again suggests, as a means of improving conditions, that the U. S. Public Health Service, which has a dental division, the Food and Drug Administration of the United States Department of Agriculture and other scientific departments of the United States government conversant with medicines and related subjects be consulted before the issuance of patents on dental medicinal preparations, or that at least an adequate investigation of the literature pertaining to dentistry be made before the issuance of patents for products in this sphere.

BARBITAL COMPOUNDS

The current edition of Accepted Dental Remedies lists only barbital and phenobarbital, since it is felt that the use of these two hypnotics fulfil all the legitimate requirements in a dental practice. Nevertheless, dentists continue to use, and to write in dental journals of, the newer analogs of barbituric acid. Many of these statements are injudicious. Some of them clearly indicate the influence of advertisements on the writer. The Council reviewed the situation and pointed out that the views expressed in the general article of the Council on the "Uses and Abuses of Barbitals" (Report of the Council, THE JOURNAL, 18:152-55 [Jan.] 1931) were still valid. It takes the position that any barbital may be considered for admittance to Accepted Dental Remedies if it is marketed in compliance with the rules, since they are all effective and are quite similar. Some are more readily excreted than others and some decompose more readily; hence, it is possible to make use of all types, on the basis of the reaction desired. The Council pointed out that those which are eliminated more rapidly may be more useful when their intravenous use is indicated, but this, on the whole, is a topic generally without the scope of the dental profession except in the case of rare emergencies, as pointed out in the general article on intravenous medication (Report of the Council, THE JOURNAL, 18:1787 [Sept.] 1931).

It is noted that several of these compounds are listed in the current edition of New and Nonofficial Remedies. Their inclusion therein signifies that they are being marketed in compliance with the rules of that Council. But the uses of this class of compounds in general medicine and in general surgery goes beyond their legitimate uses in dentistry. In addition to the claims permitted in Accepted Dental Remedies, the following are some of the legitimate uses in medicine and surgery: in obstetrics, control of convulsions from tetanus, rabies, status epilepticus, meningitis and eclampsia, control of pain due to bilateral thrombosis of the iliac arteries, severe scalding, gastric crises, gallstone and renal colic, migraine and malignancy.

The Council holds that these products may be admitted to Accepted Dental Remedies provided acceptable literature prepared especially for distribution to the dental profession is submitted, since this group of compounds is among the most inviting for self-medication without diagnosis.

Agranulocytic Angina: Since the monograph in Accepted Dental Remedies on amidopyrine was published (THE JOURNAL, 21:338 [Feb.] 1934), reports in the medical literature have appeared concerning the supposed connection between the appearance of leukopenia and the administration of amidopyrine.

Following much discussion on the dental phases of this disease, and the dental interest in it, the secretary of the Council was instructed to revise that portion of Accepted Dental Remedies on amidopyrine by the addition of the following: "It has been reported that amidopyrine, with or without barbitals, may be a causative factor in the production of agranulocytic angina (neutropenia, leukopenia) (Madison, F. W., and Squier, T. L., Etiology of Primary Granulocytopenia: [Agranulocytic Angina] *J.A.M.A.*, 102:755 [March 10] 1934.) In view of these circumstances, it is desirable that dentists use this drug alone or in combination with barbiturates or other drugs, with this fact in mind."

A member of the Council was invited to prepare an article for the Council's series on pharmacology and therapeutics regarding the supposed relation of amidopyrine and agranulocytic angina and its interest to dentists.

PUBLICATION OF PAPERS IN THE JOURNAL LISTING OR DESCRIBING NEW DRUGS OR DRUGS NOT ACCEPTABLE TO THE COUNCIL ON DENTAL THERAPEUTICS

From time to time, the manuscript division of THE JOURNAL requests the advice of the Council about drugs as they appear in articles read before dental societies and then submitted to THE JOURNAL for publication. Some of these drugs are outrightly unacceptable; some of them are new drugs in the experimental stage; some of them, such as Dilaudid and Metrazol, have been accepted by the Council on Pharmacy and Chemistry, and others, such as Coramine, have not been the subject of reports by the Council on Pharmacy and Chemistry or this Council.

It is obvious that the first interests of a journal or an organizational body are those of its readers or those for whom the body works. Hence, the Council moved that, in the case of manuscripts submitted to the Editor listing new drugs, the Editor be requested to withhold from publication those papers mentioning new or unaccepted drugs, and other products within the purview of the Council, until they have been submitted to the Council and a report prepared by the Council to accompany the original paper in the same issue of the publication, if possible. The editor indicated to the Council his hearty agreement with the purpose of the motion.

The action on the part of the Editor reaffirms a request made to the Board of Trustees by the Council and granted by them in the early history of the Council. If this policy is carried into effect, it will remove the possibility of articles on new drugs appearing in THE JOURNAL which are later used to exploit these drugs to the public or the profession.

ACCEPTED DENTAL REMEDIES

The Council was apprised of the fact that the manuscript of the book Accepted Dental Remedies has already appeared in THE JOURNAL. The responses gathered from various directions are gratifying, and indicate a desire for this material. In this connection, a resolution passed recently by the California State Dental Association is of interest:

The California State Dental Association in its regular annual meeting, takes this means of expressing to you our appreciation of the value of your work in therapeutics as applied to dentistry.

We are confident that as time goes on we shall realize this value more and more, both in the possibility of securing our drugs at a considerably reduced cost, together with the wiser and saner use of the same.

We are anxiously awaiting the book A.D.R. for we need it in the conduct of our practices to-day.

In order to ascertain the number of copies of the first printing that might be taken up, a letter was sent to the deans of the thirty-seven dental schools in the country, asking

whether they would care to place the book on either their recommended or their required list. According to the requirements calculated on the basis of the replies and on our own estimates, it appears probable that 600 copies will be taken, on a conservative estimate, and 1,100 on a more liberal basis. If the material is properly publicized by THE JOURNAL, a larger number may be sold.

The Board of Trustees was apprised of these facts and agreed to the publication of the book provided the Council could finance its publication from its own budget. The original allotment to the Council did not provide for this venture, but, sensing the desire of the profession for this book, and the usefulness to the profession, the work of the Bureau of Chemistry and of the Council during the past fiscal year has been so arranged as to provide for this contingency. The manuscript of the book has been turned over to the appropriate department in the Central Office to obtain printing estimates.

The book will be ready for distribution about August 1. It is planned to reset the type in a readable and inviting form, and amplify the book with several useful appendices. One of these will carry references to all the reports of the Council on unaccepted products, as there has been a large demand for such a list.

CHANGES IN THE RULES OF THE COUNCIL

When the explanatory comments on the rules of the Council were prepared in 1930, the Council was still considering the feasibility of preparing two books, one on useful official drugs and the other on accepted, nonofficial drugs. Since that time, the plan of the Council has been changed so that both classes of useful and acceptable drugs will be contained in the same book. This necessitated some changes in the explanatory comments on the rules.

The present introduction to the rules reads: "The term 'proprietary article' in this place shall mean any chemical, drug or similar preparation used in the treatment of disease." This is revised to read, "The term 'proprietary article' in this place shall mean any chemical, drug or similar preparation used in the treatment of disease or for oral hygiene purposes."

The following was added to Rule 9: "For dentifrices put on the market after the formation of the Council (January, 1930), one of the conditions of acceptance is that the product be named 'So-and-So's Tooth Powder' or 'So-and-So's Tooth Paste' or '. . . Dentifrice.' This is intended to minimize the many misleading and tricky trade names for this class of products. Under no conditions can the Council accept a dentifrice which bears the prefix 'Doctor' or the suffix 'D.D.S.' or 'dentist' as part of the principal designation." This places in the official rules of the Council the action of the Council taken in 1932, to rationalize the naming for these products.

Under "Scope of the List," for Official or Accepted Articles, the following was deleted: "Articles official in the U. S. Pharmacopeia (U.S.P.) or National Formulary (N.F.) or accepted for inclusion in New and Nonofficial Remedies (N.N.R.) of the Council on Pharmacy and Chemistry of the American Medical Association are exempted from consideration by the Council if they are marketed under the official or unofficial name which makes their official or unofficial status evident, and if no unestablished therapeutic claims are made for them" and replaced by: "Articles official in the U. S. Pharmacopeia (U.S.P.) or National Formulary (N.F.) or accepted for inclusion in New and Nonofficial Remedies (N.N.R.) of the Council on Pharmacy and Chemistry of the American Medical Association are within the scope of the Council if such simple or compound preparations are useful for the practice of dentistry."

At the present time, the scope of the Council does not include the consideration of ceramic and metallurgic articles and physical therapy apparatus, and other mechanical appliances. The scope of the Council was so modified that it will not for the time being, consider these articles for acceptance.

Mouth washes were deleted from the class of preparations that might be acceptable for advertising to the public, since the Council, on the basis of its position on mouth washes (THE JOURNAL, 19:1239-1244 [July] 1932) does not accept this class of products.

Revision of the Rules for the Use of the Seal: The Council's rules for the Use of the Seal provide that the present seal on trade packages shall not be greater than one-half inch in any direction. There are certain conditions under which the use of a larger seal is legitimate since dentifrices are now being marketed in larger packages than formerly. Consequently, the rules for the use of the seal were modified by deletion of the following: "The maximum size of the seal permitted on the package shall be one-half inch in height or diameter."

COOPERATION BETWEEN PHARMACISTS AND DENTISTS

The Council recognizes the desirability of a closer cooperation between members of the dental profession and the prescription pharmacy. The Council holds, in the last analysis, that prescribing is an individual affair between the dentist, the patient and the pharmacist, which is best executed by a written order on the pharmacist for medicinal agents for a required course of treatment. For those pharmaceutic preparations used in dental offices, there is a legitimate and useful field of endeavor for the pharmacist. It is gratifying to note the activity of some schools of pharmacy in cooperating with state and local dental societies for the presentation of material of mutual interest. It is hoped that when Accepted Dental Remedies is published, this cooperation will be accelerated.

The Council stands ready to assist in any legitimate effort in this direction.

ARTICLES ON PHARMACOLOGY AND THERAPEUTICS

In the past, the Council has published articles on general or debatable topics in dental therapeutics. These articles were intended to evaluate the certain classes of drugs or therapeutic procedure, particularly those in dentistry. It is planned to continue the preparation of these articles. Some of the topics suggested were: "Drugs Used in the Treatment of Trench Mouth"; "Evaluation of Antiseptics for Oral Use (Apart from Rinses) with Special Reference to Oral Antisepsis and Antisepsis of Broken Tissues"; "Use of Barbital and Amidopyrine, with Special Reference to Agranulocytic Angina," and others along these and similar lines.

STATISTICAL SUMMARY OF THE COUNCIL'S WORK

The Council was apprised of the numerical status of the many products before it as of April 1, 1934. This tabulation is given for the interest of the members of the profession:

Products announced as *accepted* in THE JOURNAL, 166.

Products announced as *not acceptable* in THE JOURNAL (including Notices of Judgment), 94.

Products *not acceptable*—reports not yet published, 106.

Products reaccepted, 21.

Products omitted from A.D.R., 6.

Acceptance and provisional acceptance recommended, 41.

Acceptance not recommended, but still under consideration, 7.

Awaiting more evidence from proprietor for final consideration, 8.

Products acceptable, announcement delayed for the time being, 1.

Awaiting the report of the referee, 3.

Consideration postponed, 28.

Exempted list (official U. S. Pharmacopeia articles for which no unwarranted claims are made), 37.

Products examined in the Bureau of Chemistry—findings not yet published, 55.

Total, 574.

Minus items 4 and 5, 27.

Net total, 547.

Products discussed in answer to inquiries, etc., not including the above-mentioned products, approximately, 750.

Total products brought to attention of the Council in one way or another, 1,297.

At this time, the Council desires to acknowledge the generous support that it has received from many individual members and component bodies of the Association.

ACCEPTED DENTAL REMEDIES

The following articles have been accepted as conforming to the rules of the Council on Dental Therapeutics of the American Dental Association for inclusion in the list of Accepted Dental Remedies. The Council desires dentists to understand that the admission of an article does not imply a recommendation. A copy of the rules which govern the Council in the consideration of articles will be sent on request.

SAMUEL M. GORDON, *Secretary*

ANESTHETICS—LOCAL[1]

Butyn (10%) Topical Anesthetic.—Butyn, 10 gm.; alcohol, 9.5 c.c. in distilled water to make 100 c.c., with flavoring and coloring.

ACTIONS AND USES: See Butyn (J.A.D.A., 20:1898 [Oct.] 1933).

Manufactured by Abbott Laboratories, North Chicago, Illinois.

DENTIFRICES[2]

Ward's Tooth Powder.—COMPOSITION: Each hundred grams is said to contain tricalcium orthophosphate (Victor), 95 gm.; soap, 4 gm.; methyl salicylate, 0.6 gm.; oil of peppermint, 0.3 gm.; saccharine, 0.1 gm.

CLAIMS: Ward's Tooth Powder is offered as a cleansing and polishing agent for the accessible surfaces of the teeth when used in conjunction with the toothbrush.

Manufactured and distributed by Montgomery Ward & Co., Chicago, Ill. No U. S. patent or trademark.

1. Anesthetics—Local, J.A.D.A., 20:1895 (Oct.) 1933.
2. Dentifrices, J.A.D.A., 20:2076 (Nov) 1933.

THE NOSTRUM TRAFFIC

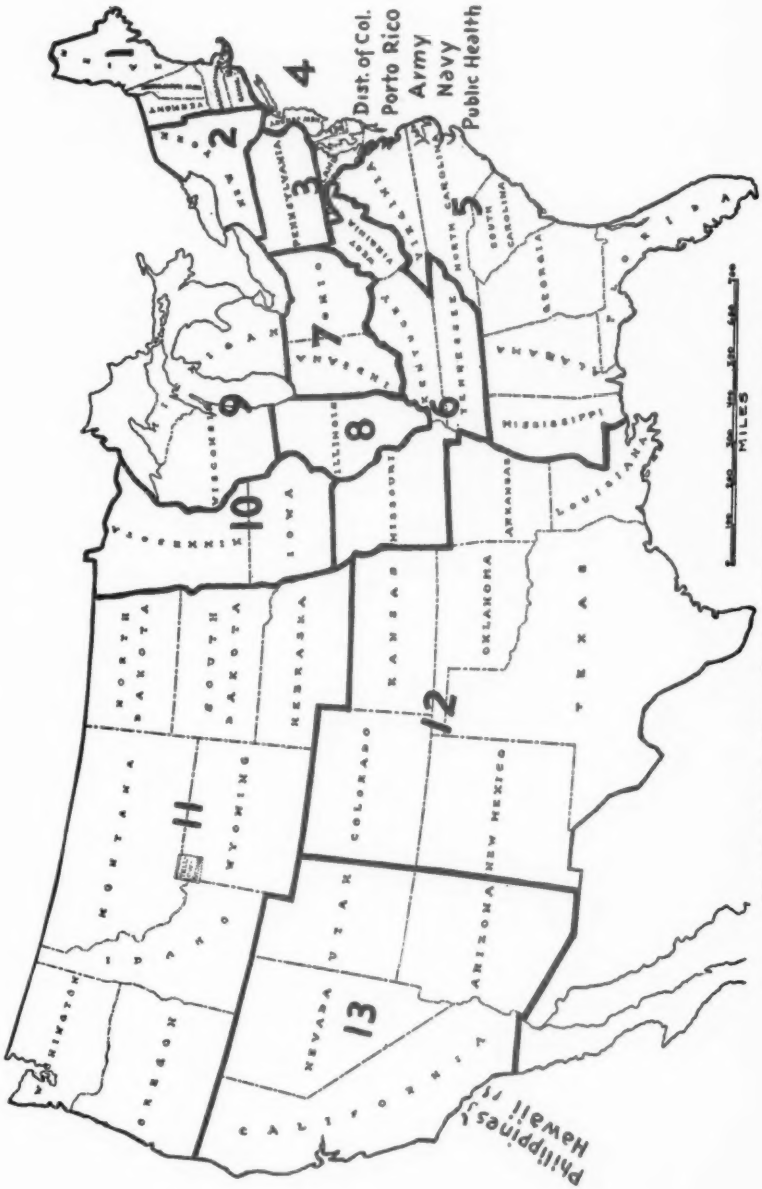
One really great evil which pertains to the nostrum traffic, and one which is not usually considered, is the deliberate attempt to misrepresent and belittle the value of thoroughly well established official remedies. If a manufacturer attacks the products of a rival a counter attack will let in too much light for the good of either, hence there is a mutual regard, or at least tolerance, established between nostrum makers, but it appears that no one is particularly interested, at least financially, in the official materia medica, and attacks may be made on official articles with impunity. . . .

The following simple rules of prescribing have been formulated by Torald Sollman and are well worth careful consideration:

1. Do not use any new substitute (except in the way of scientific experimentation) unless it possesses distinct advantages over the older remedies.

2. Do not use a ready-made mixture in conditions which require individual consideration.

3. Do not prefer monopolistic proprietary remedies to official drugs.—Hatcher and Wilbert, in "The Pharmacopeia and the Physician."



Map showing the thirteen districts of the American Dental Association.

BUREAU OF PUBLIC RELATIONS

EFFECT OF GROUP PRACTICE UPON DENTIST AND PATIENT*

By E. W. MORRIS, D.D.S., Battle Creek, Mich.

THIS paper is not a discussion of group practice as generally implied by the word "group," in which several dentists band together for the advancement of their own individual specialty, with the idea of rendering a highly specialized service to the patient, or one in which several dentists work under one head on a salary basis.

I wish to interpret the word "group" to include all ethical dental practitioners of a community, considering how they as a group can help solve some of the problems that are confronting them, their profession and their community, and can ultimately benefit the dentist, as well as the patient.

The problem of providing adequate dental care for any community is primarily one involving three conditions:

1. There is a demand yet to be created on the part of the public for adequate dental treatment.

2. The dentist must prepare himself to meet this demand.

3. A method of exchange between the first and second conditions must be developed.

A great many elaborate plans have been developed throughout the country, in an effort to help meet these problems. In conjunction with our educational system and health departments, clinics have been established in the schools, or in conjunction with the schools, to care for the dental needs of the child. These programs have been employed by scores of hygienists and nurses, who have tried to educate the child and the parent as to the importance of having dental defects corrected. In many instances, neither the child nor the parent has been considered, the aim being to do the greatest good for the greatest number, at the lowest possible cost to the institution.

These programs have been advanced by news stories, radio talks, health bulletins, posters and various types of advertising, all designed to educate the child and the parent about conditions of health that should never have been allowed to exist.

In addition, various groups (many going under the name of clinic) have been established with the hope that they can render a service more commensurate with the needs of the people. Many of these groups work on a mass production basis, and some are not entirely ethical.

For the past year and a half, various plans have been developed in an effort to take care of the emergency work for indigent people. These plans, which are as numerous as the communities in which they are developed, are all designed as temporary measures, with the hope that we will soon be "around the corner," and

*Read at the Seventieth Midwinter Clinic of the Chicago Dental Society, Feb. 27, 1934.

that this type of low-fee service will not have to be rendered for any length of time. What they are really doing is trying to avoid facing the actual problem which confronts us, i.e., supplying adequate attention for the entire population.

The programs in the schools for the correction of defects have failed primarily because the relationship between the patient, dentist and family has not been a personal one, as it must be if any of the fine capacities of that relationship are to be achieved. If any relationship at all is established, it can be only between the few, and is soon lost, owing to the vast amount of work that has to be done in these clinics. What dentist who is paid for certain operative procedures continuing from six to eight hours a day is going to take any personal interest in the child other than to regulate his conduct while he is in the dental chair? This whole procedure, as far as he is concerned, is an impersonal one, in many instances offering him an opportunity to become acquainted in a community where he eventually plans to conduct a private practice. Thus another dentist has been brought to the community in the interests of better health for the child, doing work that the local practitioner should do and has the time to do, and eventually locating there, further reducing the local practitioner's chance of earning an adequate living.

It is difficult, if not impossible, to interest parents in an impersonal organization (such as a clinic) in matters concerning the health of their child, when there are so many other organizations that are much more entertaining, such as bridge clubs.

What actually has taken place in a large number of homes is a transfer of confidence to the school hygienist or nurse. The school dentist sees the child only for a short time (usually at an hour when it is impossible for the parent to be present), and is entirely dissociated from the physical and family history except as far as can be related to him, second or third hand, through a form.

Correction of defects is not due to the parents' confidence in the dentist, but to their confidence in the school nurse, who said it would really be a good thing to do what the dentist said.

Another feature of this program that is overlooked is the fact that the parent (whether he is indigent or is one of those persons who believe it the duty of the school to be the physician, the dentist and the teacher to the child) has no idea as to the value of the treatment received and will probably always believe that dentistry is a necessary evil and something beyond average means. It is true that, in many of these programs, prevention is practiced, and these programs are commendable because of the leadership and educational technics they have developed in this field. It is probably an economic necessity for such clinics to practice preventive measures, because of a lack of funds to carry on any other type of program, and not because of any great foresight on the part of the educators.

In this day of rapidly diminishing returns, many of these school clinics have suffered along with those which have been sponsored by various departments of health and philanthropic organizations; all of which makes it more necessary that the profession adopt some plan to meet the demands that will be placed on us, if we are to take an active part in adjusting ourselves to the new social and economic changes that are developing. The various types of group practice have fared no better in trying to supply care for the masses, and, if the truth were known, they were probably formed for the economic advancement of the members, without any thought of sup-

plying adequate dental attention for the masses.

I believe that if a fraction of the time, energy and money now spent in these ineffective means (such as school clinics and low-fee clinics) were spent in educating the child and the parents to consult the family dentist in regard to matters of mouth health, and in preparation of the dentists for this opportunity, a program of increasing effectiveness and efficiency, at a progressively decreasing cost to the people, could be developed.

Since publication of the report of the Committee on the Costs of Medical Care, all branches of the healing art have been trying to find a way to prepare themselves to meet the demands that they believe will be made on them. In dentistry, some hoped that we would find a means of preventing decay, that the profession might have an opportunity to do the amount of remedial work necessary to date. Various suggestions have been considered in regard to panel systems and group payment plans or some other system that would mean nothing more than a cure in organization. Surveys have been planned, with the possible hope that we had not been doing such a bad piece of work; but without any plan for correcting the conditions which we knew would be found.

The work that is before us is far more than we can hope to do, provided we are to continue as we have, that is, practicing corrective dentistry. One of the publications on the cost of medical care states:

> The amount of dental care requested by the people of the United States, when calculated in terms of personnel necessary to supply the service, depends greatly upon the manner in which the practice of dentistry is organized. If dentists performed all their own laboratory, x-ray photography, and scaling and cleaning, some 217,444 would be needed. If dentists were to confine their services to only chair work requiring professional services, and were to employ x-ray and laboratory bygienists for the performance of all strictly routine and mechanical tasks, the number of dentists required for the population as a whole could be reduced to 121,081 practitioners.[1]

It seems from this that the task is far beyond us for some time, but that fact does not lessen our responsibility to make an attempt to meet the problem. We have to date only 64,000 dentists, which would be an inadequate number to do the necessary dental work for the masses, even though we had all the assistance mentioned above. If a plan were forced on us, it would have to be limited to the manpower that the profession has at this time. It seems that, with this condition existing, the profession will have a chance to choose in part the course that it will take.

We have in our hands today one of the weapons that will lessen our chances of being forced into an economic plan which will destroy our right to conduct an individual practice; that is, prevention. It has been preached to us for years that we can practice preventive dentistry with less cost and less pain to the patient, and with much less effort on our part. Again quoting from a report: "Methods of preventing disease should be more dextrously and more efficiently applied, as measures both of service and of economy and should be so financed as to minimize the deterrents to their extension."[2]

Let us then consider the three previously stated conditions to see whether a preventive program will provide a solution, so that they can be carried out. As stated in the first condition, there is a demand yet to be created on the part of the public.

Curative dentistry did not need an

1. Falk, I. S.; Rorem, C. R., and Ring, Martha D.: Costs of Medical Care, University of Chicago Press, p. 240.

2. Footnote 1, p. 588.

educational technic; preventive dentistry demands one. No education is needed to get the child with a toothache to a dentist's office, but it is too late to practice prevention after the tooth has the symptoms of disease. Therefore, we are justified in criticizing ourselves for our past attempts to solve our problems by trying to find a cure in organization rather than making an honest attempt toward prevention. If, then, the chief difference between the preventive and the curative program lies in the educational factor, we have but one method before us. The dentist himself must do the educating simply and directly, with profit not only to the patient, but also to himself. If left to the parent, the choice would be obvious: What parent would not prefer to learn the child's dental condition from his own family dentist rather than to receive an impersonal statement regarding the work to be done? The public must be educated along preventive lines to the extent that they will see the health and economic advantages of such a program, and be led to demand this type of service. This demand cannot be created by the profession alone, but must be the result of the sum total of the various forces that can be utilized to educate the public. The involving forces vary in direction and intensity, acting on the individual. Sometimes, these supplement one another; sometimes, they conflict.

All professions are forces in health education now undeveloped or negative, but still educational in the sense of contributing to the patient's experience. Every patient who makes a trip to the dentist's office is being educated. It is the part of the profession to make the most of this opportunity.

This, then, is a challenge to the profession. The simple suggestion of a dentist who has the confidence of a family, "Of course, Johnny will have his teeth taken care of at regular intervals," is worth more than any amount of education, direct or indirect. However, we cannot stop at this point. All dentists have a vast amount of knowledge that should be available to the public, but the difficulty is that we have so much more knowledge than we can ever hope to use in carrying out our part of this program that it is difficult to scale this knowledge for the public's use.

This, then, brings up the second condition, that the dentist must prepare himself to meet this demand; which necessitates the dentist's stepping into the rôle of the teacher. In our old educational methods, the educator procured his material from any and all available sources, passing it on to the teacher, and from the teacher to the child. It made little difference to him whether the material met with the ethical standards of the profession, and the profession was unaware of the type of material being used, or how extensively it was being used. As a result, most of our educational material in dentistry has come from sources which we now consider unethical. We cannot blame the educator for this, for he took the material that was available, and adapted it for use in different grades; but he had little or no idea as to whether this was what the child should learn in regard to dental health.

Newer educational methods deal with units of work in which the child is brought in contact with life experiences. In dentistry, this means that the child will be brought in direct contact with the dentist, who must assume the rôle of teacher, while the academic teacher steps into the background. The dentist becomes the motivating force, and introduces the child to a real life situation. The advantages of this method are evident, and it affords the dentist an oppor-

tunity to make a much needed contact with the child. If we are going to take over these new duties, as the educators are demanding, we must: (1) definitely determine the facts that the child should know, and assist the educator in obtaining knowledge of and arranging these facts; (2) prepare ourselves to be teachers; which means better understanding of child development, and (3) correlate our operating technic with our teaching technic. This will necessarily vary with each personality.

The third condition, regarding a method of exchange between the first and second conditions, is a purely economic one. But the first condition, that of creating a demand on the part of the public for adequate dental treatment, and the second condition, that of the dentist's preparing himself to meet this demand, must be developed first. Unless we unite our forces to solve the first two, there will be little need of considering the third condition.

The only forces that we have discussed in this plan so far are those that can be controlled by the dentist, and, as I stated before, the problem of getting any patient to consult the dentist, whether it be for remedial or for preventive treatment, involves a great many forces.

For example, take a simple situation involving a child and spinach. If, in the simplest home and school environment, the teacher and both father and mother are agreed on spinach, little Johnnie will like spinach. If the teacher believes in spinach and the parents do not, any results obtained may be the basis of later behavior problems.

Actually, the situation is seldom as simple as this, and the attitude of the child or the child's parents toward spinach is a summary of personal experiences with spinach, plus the attitudes toward spinach of all the persons the child comes in contact with, relative weight depending on the individual. If these forces were in favor of spinach and took it as a matter of course, there could be little doubt as to Johnnie's attitude. However, we all know this is far from being the case. If there is so much difference of opinion among these various forces as to spinach, how complex the situation must become with regard to getting the child to the dentist. The point is, of course, that without a truly coordinated program reaching into all the forces educating the child on health matters, results obtained with the individual child will vary tremendously.

Such a project involving all these cooperating agencies is being tried in three counties in Southwestern Michigan, and the W. K. Kellogg Foundation is assisting the people of the three counties in developing a health education program on cooperative lines. These three counties have a population of 90,000, most of whom are of Yankee stock, and 90 per cent born locally. This is a typical rural area with three towns, with populations of about 5,000 each, and a few industries. An analysis of the educational forces bearing on the health of children discloses the following: forty dentists; eighty physicians; three health officers; three sanitary engineers; three public health nurses; three rural school commissioners; fifteen school superintendents; 700 school teachers; eighteen editors; forty preachers; sixty county councilmen; twelve character-building leaders (Boy Scouts, Camp Fire Girls, etc.); three Rotary clubs; three Kiwanis clubs; six moving picture theaters; parents and other people; other children.

How can all these agencies be brought together, so that the dentist will be materially benefited? I will try to present the plan, but not with the idea that it is unique or universally applicable. We are

enabling the various individuals concerned in this project to understand the problems by actually handling them, and by working out technics for their own solution. We do not expect a child to learn to walk and run by telling him about it or by showing him pictures of people walking and running. He must walk before he runs, and he must crawl before he walks; and we are not unduly surprised if he takes a few bumps in the process. Dentistry, though old in history, is in its infancy in providing service to mankind, in the prevention of disease and the promotion of health. We do not feel that we are going to answer all the questions in the first attempt, but we do hope that we will be able to assist the dentists in these territories to make a constructive effort to improve conditions by utilizing the powers that are at their disposal. All we ask is that they handle their own problems and learn not only from their own experience, but from the experience of others in the project.

Each of these three counties has a county health unit, with a medical health officer. The unit, which is the minimum recommended by the American Public Health Association, is in no way remarkable, except as to the health officer. He acts as an executive coordinator and administrator—as the executive secretary of the medical and dental society—but does not practice medicine either curative or preventive. He thus avoids the difficulties based on the competition usually existing between the private physician and the health officer. Faced with the same responsibilities as the average health officer, he must achieve essentially the same results, but he must do this through the cooperation of the physicians and dentists of the county. Such a health unit is essential to a cooperative program of this type; for obviously we must have some agency that will coordinate all groups interested in the health of the community and act as the administrative agency for these groups. A well-organized health unit is the logical agency to take over this work.

At the last meeting of the Michigan State Medical Society, the assembly voted to adopt such a unit plan for every county in the state, and for those counties already having such units, it was voted that the health officer turn over his work in preventive medicine to the local physicians. Earlier this month, a similar resolution was passed in Wisconsin.

Thus, we have the foundation laid for the medical profession's part in this program. All preventive measures, such as vaccination, immunization and Schick and Dick tests, are carried out in the private physician's office after proper preparations are made for such procedures, by postgraduate instruction in their own medical meetings and more intensive training in some of the larger medical centers.

In addition to the county nurse, we have added to the health officers' staff four teacher-nurses, who, in addition to their nurses' and public health training, have the qualifications of teachers. They have B.S., B.N. or M.S. degrees in education, in home economics, nutrition, nursing or general science. Each nurse is assigned a number of townships or a section of a county and has charge of the health education program for all the schools, both urban and rural, in that territory. She understands the school situation and can assist the teacher in helping the children realize their problems and can direct them in finding solutions.

The nurse acts as consultant and advisor to the teacher. She interprets and makes usable for the teacher planning her health program the technical knowledge of the professional groups. The teacher-

nurse, in turn, may bring to the teacher a knowledge and understanding of home situations which definitely affect a child's behavior and which, in turn, might aid the teacher in understanding a child's reactions to certain phases of school life. With this understanding, which eventually may become common to physician, parents and school, some cooperative plan may be evolved to help the child in making adjustments.

These teacher-nurses are not added to the county health staff with the idea that they are to be there permanently, but only until such time as the professional groups have been prepared to take this work over.

The medical societies, realizing the importance of a periodical examination in a constructive prevention program, conduct physical examinations in all urban and rural schools in the three counties, which number about 450. As it was necessary to give the teachers background for this type of educational work, health education encampments were conducted for the teachers of each county. These encampments, which lasted from Friday evening until Sunday evening, were attended by practically every teacher in each county; which shows that the teaching profession is demanding more positive work in health education, and is eager to cooperate to the fullest extent with the other professional groups.

At these encampments, the various teaching technics most adaptable to health programs were discussed. We believe that, in the light of modern education, health should be taught in connection with other learning experiences, and should be integrated with all the activities of a child's day. The dental program was explained to school teachers in detail by one of the participating dentists, so that they would be familiar with the work the dental society hoped to carry on, and could assist it at every turn. A demonstration of a dental examination as it would be conducted in a rural school was given. The teachers learned something of dental nomenclature, dental ethics and the material that should be used in a dental health program. The teacher-nurses also assisted the teachers in planning projects that could be carried out before the dental examination, and others to follow the examination. Similar work was done by the medical men, to familiarize the teachers with their program. Speakers of national note were also brought to these groups and assisted greatly in tying the various programs together: one night, a health speaker; another, a physician, a dentist; etc.

And now we have added another important group to our plan, which will probably be of more real assistance to the dental group than any other. The first step in the dental program was to organize the county dentists into societies. Only about 10 per cent of the dentists were affiliated with the state and national organization, and they had no local groups to take care of their community problems. We now have three county dental societies, with every member affiliated with organized dentistry, many of them for the first time. The advantages of this step are obvious to those who attend this meeting, but it is surprising to find so many capable men who are leaders in their community and who do not belong to organized dentistry. All problems relating to an adequate health program for these communities are discussed, and passed upon in their local society meetings, each dentist acting as the administrator for the program in the area from which he should naturally receive his patients. For example, the societies deemed it advisable to determine the needs of their communities, and proposed that a survey be made, along with the examination of

all school children, with the idea that this survey be repeated at regular intervals so that they could determine the progress of their program, as far as the community was concerned.

The examination offered an excellent opportunity for them to cooperate with the teachers and thus develop an educational project around the examination. The teacher-nurse acted as an intermediary for the dentist and procured material for the teachers and assisted them in planning a worth while dental project. This work was done for several weeks preceding the examination, and, on the dentist's arrival, the children had a great many of the fundamental principles of dental health well in mind, and knew what to expect from the dentist.

This educational program has a double purpose: It gives the child valuable information as to what constitutes good dental procedures and it acts as an incentive to the dentist to do his best. Take, for example, the question of personal hygiene and sterilization of instruments, which is one of the first subjects taken up in most hygiene courses. If the child is well aware of these principles and, at the time of the dental examination, the dentist neglects either of these points, the child is quick to lose confidence in his ability. When each dentist is taking care of the territory from which he naturally receives his patients, or if it is divided among several dentists located in one community, the ones that do not make the most of the opportunities afforded them by this contact will eventually lose. This is the only check we have on the program as regards the service that the dentist renders. We go all the way to meet him in regard to every problem, and have no inspectors to check his work or anyone to see whether he plays the game squarely. The true facts in regard to good dentistry are presented to all groups, and through the teacher to the child, even to the extent of what constitutes a good dental office, and if everyone in the community knows the true facts, the dentist who is neglecting any detail will gradually work his way out of any constructive program. For example, if a child and parent know the importance of deciduous teeth in relation to the development of the face and jaws, and a dentist should minimize the importance of taking care of these teeth before either the child or the parents or should neglect to do the necessary work in connection with these teeth, he might lose a patient. The parents are invited to these examinations and the dentist takes this opportunity to do his first educational work. At the conclusion of the examination, most of the dentists give a talk to the parents and children in regard to the conditions he has found, and as to the importance of having corrections made. These examinations are usually held at the same time as the physical examination, and this gives the physician and dentist an opportunity to correlate their findings and pass them on to the parent and child.

In communities where transportation is not a question or where it can be conveniently arranged, the examinations are made in the dental offices. If there are several dentists in the community, they arrange definite hours to do this work, so that the children can go to the dentist of their choice. We stress the point that each family should have a dentist with whom they feel free to discuss their dental health problems, and that it is just as important to have a family dentist as a physician. We feel that the examination made in the dental office is far superior to that made in the school, for it affords a much better dental contact for the child and improves the dentist's opportunity of making a real contact. If we are ever going to make the program a success, we

must get the child and parent into the dental office. There must be parent education in this program, in order that the parents understand health problems and feel their responsibility in the program. The teacher-nurse visits the home, becomes a part of the P.T.A. and other community groups that are interested in child study. Where there are no such organizations, she attempts to promote their organization. She can bring in outside speakers on such subjects as are of interest to these groups.

As the dental program developed, the demand for speakers on dental subjects grew to such proportions that it was developing into a real problem. This question was brought up in dental society meetings, and it was decided that each dentist should again take care of his own local community. An educational committee was appointed, with instructions to secure suitable material that would assist the individual dentists in planning talks, and even going to the extent of writing outlines to be followed. Pamphlets, reprints, etc., which were suitable for lay reading were purchased, to be distributed by the dentist as a compliment of the county society. This committee saw the advantage of having some visual education material and prevailed on the county health officer to assist it in obtaining such material. On recommendation of the society, the health officer placed a moving picture projector, dental educational films, shade profector and slides in his office, to be used at any time by any member of the society.

This again places the dentist in the rôle of the teacher and increases his value to his community.

This educational examination program, in which all children, urban and rural, were examined, proved to be of immense value to the dentists, and increased their practices materially. It is difficult at this time to give any accurate figures on this point, but they will be available at a later date. The fact that every professional man in the three counties is actually engaged in this program speaks for itself.

The next important problem that the dental group had to consider was some feasible way of developing a true preventive program; one that they could handle with the man power that was available. It was decided to concentrate on the lower grade group in the educational remedial program. The selection of this group was determined from the statistics received from the survey. It was evident that it would be a physical impossibility to take care of all the dental needs, but if a constructive piece of educational work was done on a group at the age when prevention could be practiced, and continued over a long enough period of time, definite results could be obtained. It was necessary to forget all those in other grades that needed service the first year, as this type of program must develop slowly and cautiously.

This program was not developed with the idea that we would eventually be taking care of all the school children's dental needs, but it merely offers a project for the dental group in developing and carrying out the activities essential in planning an adequate dental health program. This type of project, which has three factors, gives the dental society a chance to see how much they can do themselves toward developing a program.

The patients in this remedial program divided themselves into three groups as far as the dentist was concerned: (1) those that could afford to pay for the remedial work and, as a result of educational work, would see a dentist; (2) those that could afford to pay something (many of this group found that they could afford to pay the entire cost) and,

(3) the indigent group. After the supposedly indigent cases have been investigated by the health unit's staff and other relief agencies, the information is sent to the dentist of their choice for his and the final check as to the patient's ability to pay. This gives the dentist a chance to have the final say in regard to their status.

At this time, in the dental meetings, it was necessary to discuss the third condition that I mentioned before: that of a method of exchange between the first two conditions; namely, the demand of the public and preparation of the professions. We said to the participating dentist in this area that we would provide the means to meet the third condition, if they were interested in seeing how far they could develop the first two; always with the understanding that when the demand was created and supplied, the problem of distribution would be dealt with in its own right and in the light of the methods evolved meantime to bring about the first two conditions. We feel that this is one of the chief services that the foundation has to perform. It would be futile to argue about the relative values of cash and time payment plans for the purchase of automobiles in the days of the horse and buggy.

We went a little farther than just supplying the means: we let the dentists in their meetings determine the fee they would receive for rendering their services. This was placed on an hourly basis by all the groups except one, which preferred to take care of the indigent and part-pay cases at the regular fee, less a discount which they felt they could afford to give in the light of lessened collection activity, bookkeeping, etc. The medical societies decided on an hourly basis for services, which was exactly the same as the dentists', except for special services, which will have to be considered later by the dental groups.

The dental groups have been doing a fine piece of work in preparing themselves in various educational and operative technics involved. We have assisted them by bringing speakers on various subjects that they were interested in to their meetings, which have taken on the aspect of postgraduate conferences rather than social gatherings. Last year, we extended this service to include two weeks' postgraduate instruction at a class A dental school, with all expenses paid. These courses, which were developed along preventive lines, proved to be very popular and of immense value to the dentist. Procedures used in children's dentistry were emphasized, as it is with this group that we hope to accomplish the ultimate end of creating a demand for preventive service by the whole community. Three such courses have been given, and one more will complete the first group. Every dentist in the area will have secured two weeks' instruction. The advantages of this type of instruction, to both the dentist and the community, are obvious. This same type of postgraduate work was offered the physicians in these three counties, so that they would be better enabled to take over the preventive duties of the health office. To date, fifty-eight out of eighty physicians have taken advantage of this service.

We arrange to have the medical and dental courses given at the same time in some large medical and dental center. This gives the two groups an opportunity to exchange ideas in regard to their respective fields, and results in much better unity when they return. Also, during the year, one or two combined meetings are had with speakers who will interest both groups.

It is evident from the way these courses were accepted by the dental profession that some rational program for postgraduate instruction must be developed

for the dental groups by the dental schools of this country. If we are going into any such program as this, it will be necessary for all of us to do postgraduate work every year. As to the method that we shall develop in these three counties, we are not sure, but we feel that each dentist should have one or two weeks of postgraduate instruction in some large dental center each year, to be followed by shorter postgraduate conferences in the society meetings. For example, a group could study some phase of preventive dentistry for two weeks in a dental center during the spring and summer, and could follow it with postgraduate conferences in their own local society during the winter. The instructors for the latter meetings should come from schools of thought that differ from that of the summer training. Our postgraduate instruction also includes special courses for the health officer, so that he will be enabled to assist the local groups in administering an adequate health program.

Requests to extend these individual programs to other territories are received continuously; but, though it must be apparent that any one of these individual projects has merit, the principal advantage to the community comes from the cumulative effect. A health education program for teachers may be desirable under any circumstances, but we do not believe that it will bring returns in proportion to the expenditure, unless there is a similar program in which the dentist and physician are taking an active part. It is impossible to show the far-reaching effects of such a program as this by graphs, charts or measurements, but the dentists in these territories are thinking men, and their cooperation is indicative of the success of the program.

The entire project, in simplest terms, is an attempt to build up the professions concerned to better serve and better educate their community, offering them an opportunity to solve their problems and possibly prevent some undesirable legislation that will force them to render these services.

A MOUTH HEALTH PROJECT IN AN IOWA RURAL SCHOOL

By EDITH M. HOLMSTROM, Iowa City, Iowa

HOWARD county in northwestern Iowa has about 100 rural schools. The county superintendent, Miss Zina Fessenden, is a very enthusiastic leader in health education. By precept and example, she exerts a county-wide influence on both teachers and pupils in their better mouth health programs. At a rural teachers' institute at Cresco in April, 1934, a unique demonstration was conducted on "Integration of Mouth Health in an Activities Program." The school was composed of eighteen children from Bohemian homes and their teacher, Miss Sadie Noonan. These children (many of them do not speak English on entering school) are in all grades from first to eighth inclusive.

Some interesting features observed in this presentation were as follows: 1. All grades were included. 2. Reading, drawing, language, health, physical education,

music and club work were integrated. 3. Freedom of discussion was exceptional. 4. Chart lessons were developed by the teacher, who used heavy wrapping paper, black crayon and cut-out pictures from magazines. 5. An interesting, as well as amusing, incident was a summary of "Your Six-Year Molar," page 37-38, Ferguson's "A Child's Book of the Teeth." The simile of "bumper on railroad" and the first permanent molar was brought out so dramatically that every child and teacher must have grasped the significance of the four important molars. 6. The teacher built her program from various sources.[1]

The description of the teacher's plan is as follows:

HOW I INTEGRATED MOUTH HEALTH IN AN ACTIVITIES PROGRAM

Sadie Noonan, Elma, Iowa.

CHART LESSON—GRADES I, II, III

(Made up from "Teeth Outline" under "Health in Iowa Course of Study")

Picture of Miss Muffet,
colored by seventh grade girl.

Miss Muffet brushes her teeth after each meal and before she goes to bed.

She brushes every tooth.

She has her own toothbrush.

She does not crack nuts or cut thread with her teeth.

Each day, she has in her diet foods that make her teeth strong and hard: milk, vegetables, fruits (raw and cooked), whole wheat bread.

Rhythmic activity. The children play "Miss Muffet O" (Wild and White: Physical Education, p. 189).

Set-up statement: "There is one chore that Miss Muffet is very particular about doing."

Suggestive questions:

(*a*) What chore?

(*b*) How often does she brush her teeth?

(*c*) Why does she brush her teeth?

(*d*) Suppose she has a cavity in one of her teeth, to whom should she go?

I-II-III grades then "listen in" while the sixth grade takes up their part of the program. During this time, seventh graders draw the teeth, naming parts, also showing by blackboard drawing the effects of losing the baby teeth too soon and how the sixth-year (first permanent) molars keep the other teeth on the track (Figs. 42-43-44-53, "Child's Book of the Teeth" by Ferguson).

Suggested questions to bring out information which sixth graders are supposed to have:

(*a*) How many baby teeth did Miss Muffet have?

(*b*) How and why did she lose her baby teeth?

(*c*) When did her first permanent molars appear?

(*d*) Why is it important to keep these molars?

(*e*) How many teeth in the permanent set?

(*f*) Is keeping the teeth clean all-sufficient for the health of the teeth?

(*g*) What then does Miss Muffet do to prevent tooth troubles?

(Answers all found in "A Child's Book of the Teeth" by Ferguson.)

Grades I-II-III take up the chart lesson again, with these suggestions:

(*a*) Read the story.

(*b*) Frame the word that tells which teeth Miss Muffet brushes.

(*c*) Frame the words that tell whose toothbrush she uses.

(*d*) Why doesn't she use someone else's?

(*e*) What two things, which would do much harm to her teeth, does Miss Muffet omit?

(*f*) What foods should she have in her diet every day?

1. Iowa Plan for Dental Health Education, Bureau of Dental Hygiene; Iowa State Course of Study, State Department of Instruction; Physical Education, Wild and White; Child's Book of the Teeth, by Ferguson, published by World Book Company; The Campaign (July, 1932, edition), Iowa Tuberculosis Association, Des Moines; Black Board Lesson on Food, National Food Bureau, Chicago, Ill.; Literature from Dairymen's League Cooperation Association, New York City.

(*g*) How much milk?

(*h*) How many vegetables?

Recite the poem about the "Carrot" found on p. 1 of "The Campaign Against T. B. in Iowa," Poetry number, July, 1922.

(*i*) How much fruit?

(I have printed the names of fruits and vegetables on "stand up" cards and the children carry out the routine of selecting the two vegetables; all the fruit they want; setting the table and showing how Miss Muffet should behave at the table.)

Two more chart lessons are then introduced. "My Breakfast" and "Dinner" both taken from "Simplicity in Health Teaching" by Maud A. Brown. (These chart lessons show how language lends itself to outline form.)

This is followed by silent reading on one panel of a milk story, "The Wonderful Cow That Really Is" (Dairymen's League Cooperative Association).

Fourth graders then take care of a chart lesson (II) on "Foods for a Strong Framework" from "Blackboard Lessons on Food," (National Food Bureau, Chicago).

Grand finale: Toothbrush drill (p. 84, "A Child's Book of the Teeth" by Ferguson) at the close of which they all sing to the tune of "Tramp, Tramp, Tramp":

Scrub, scrub, scrub, are words of warning
Keep all the grinders shining bright
Use your powder, brush and paste,
There's no time to lose or waste
Keep them clean by brushing
Morning noon and night.

Incidentally, I might add that, in connection with club work in our room, a health and cleanliness inspector is appointed each week and it is his duty to check those who do not brush their teeth.

Death of Mme. Curie

Mme. Marie Sklodowska Curie, co-discoverer with her husband of radium, died of pernicious anemia at a sanatorium near Sallanches, France, July 4, aged 66. It was said that her long exposure to radiation probably hastened her death. Madame Curie was born in Warsaw, Poland, Nov. 7, 1867, and received her early scientific training under her father. After taking a degree in science at the University of Paris, she was married in 1895 to Prof. Pierre Curie. They began research on radioactivity in 1896 immediately after the property had been discovered in uranium by Becquerel. In 1898 they isolated radium from pitchblende. The Royal Society of England awarded the Curies the Davy medal in 1903, and the same year the Nobel prize in physics was awarded to them jointly with Becquerel. The French Academy of Sciences had previously honored them with the La Caze prize of 10,000 francs. In 1906 Professor Curie was killed in an accident and Madame Curie succeeded him as professor of physics at the university, the first woman to hold such a position there. In 1911 she received the Nobel prize in chemistry in recognition of her research. The University of Paris later created the Radium Institute and placed Madame Curie at the head of the research department, known as the Curie Laboratory, which she directed actively until a few weeks before her death. During the World War, Madame Curie organized a radiologic service for treatment of wounded at the front. The distinguished scientist twice visited the United States. In 1921 she came to receive a gram of radium, valued at $100,000, presented to her by President Harding on behalf of American citizens; in 1929 she returned to accept a check for $50,000, presented for her friends by President Hoover in a ceremony at the National Academy of Sciences. The latter fund she gave to her native city of Warsaw for promotion of research on radium. In 1922 the Academy of Medicine in Paris elected her a member and the following year the French government voted her a pension of 40,000 francs a year. It was said that she lived humbly in Paris, using her income for the rental of radium. Among honors conferred on Madame Curie in recent years were the Cameron Prize of the University of Edinburgh, a gold medal conferred by the International Congress of Radiology at its Paris meeting, an honorary membership in the Sociedad Espanola de Fisica y Quimica, all in 1931.—*J.A.M.A.*, July 14, 1934.

Two scenes from the dental exhibit at the Chicago World's Fair, 1934.

CURRENT LITERATURE

Dental Drugs and Preparations—Accepted and Nonaccepted (G. C. Schicks, J. A. Pharm. A., May, 1934): Schicks emphasizes the responsibility of pharmacists regarding the sale of packaged products. With few exceptions, every patented or proprietary preparation is a modification of drugs and preparations official in the U. S. Pharmacopeia and National Formulary. This fact should suggest to pharmacists that they urge dentists to use official drugs; which would encourage the pharmacist in his own work and the dentist in writing prescriptions. Schick says that he is not campaigning against the honest manufacturer of nonsecret preparations of truthful claims, but the manufacturers of secret remedies and medications that make false claims. He defines "nostrum and patent medicine," giving the legal status of patented medicines and he says that a pharmacist should not sell a preparation the ingredients of which are unknown to the medical profession. He notes that the A.D.A. has a Council on Dental Therapeutics to determine the worth of various drugs in dentistry so that men in the profession "could take guess work" out of their use of medicaments and dentifrice. He would have the Council be advisory to pharmacists in their practice as the Council is waging a relentless war on quacks, cure-all venders and manufacturers. He suggests to pharmacists their responsibility in working with the Council on Dental Therapeutics. The article quotes the rules of the Council and lists acceptable products and products not accepted.

Cancer of the Tongue (W. H. Schmidt, Arch. Phys. Ther. X-Ray Rad., June, 1934): Under etiology, Schmidt enumerates as possible causes and complicating factors sepsis, jagged teeth and poorly fitting dentures. Use of tobacco is a quite sufficient cause in many cases.

Cancer of the Mouth in Women (G. W. Taylor, New England J. Med., May, 1934): A study was undertaken to determine whether certain impressions were true concerning the incidence of cancer of the buccal mucosa in women as contrasted with men. The observations were made in the Pondville Hospital and the Huntington Memorial Hospital (Massachusetts Department of Public Health). In the series of cases presented, 1,128 were of carcinoma of the buccal mucosa, 114, or 10 per cent, occurring in women, the higher incidence being of the upper jaw and relatively few in the floor of the mouth. Tables and computations resolved into the following: Syphilis is less conspicuous as a cause in women. The use of tobacco by men may account for a greater occurrence among them. Among men too, chewing tobacco seems to determine occurrence in the lower jaw. Bad teeth are a very conspicuous factor. Men cling to bad teeth longer than women do. Improperly fitting plates are a factor. Men in general have tumors of higher malignancy than do women probably owing to the influence of syphilis. Cancer of the buccal mucosa appears to metastasize earlier in men than in women and oftener.

Effect of Pasteurization of Milk on Utilization of Its Calcium for Growth in the Rat (Martell Ellis and H. H. Mitchell, Am. J. Physiol, April, 1933; abstr. Am. J. Dis. Child., May, 1934): The pasteurization of milk slightly lowers the availability of its calcium for the growing rat, possibly by destroying some unknown constituent of the milk that favors its utilization in the body.

Recent Clinical Experiences with 3,800 Infants on Evaporated, Powdered and Condensed Milks: A Review (James A. Tobey, Arch. Pediat., March, 1933; abstr. Am. J. Dis. Child., May, 1934): Twenty-five clini-

cal investigations on the use of evaporated, powdered and condensed milk in the feeding of infants are summarized. Tobey thinks that a review of the various investigations reveals that these processed milks not only have no disadvantages, but also possess certain distinct qualities which justify their present vogue. No adverse findings have been reported. Among the principal advantages suggested for the concentrated milks are their exceptional digestibility, uniformity of composition, cleanliness and bacterial safety, high nutritive values, easy assimilability of calcium and phosphorus, convenience for making concentrated formulas, general availability, keeping qualities, simplicity of use and economy.

Vegetable Milk in Infant Feeding (J. Klein, Arch. Pediat., March, 1933; abstr. Am. J. Dis. Child., May, 1934): Two cases of seborrheic eczema are reported healed on a diet of soy bean flour. Attention is called to the composition, qualities and indications for the use of vegetable milk in the feeding of infants, and it is suggested that cocoanut milk has a higher biologic value than any other vegetable protein.

Sialolithiasis (P. W. Greeley, J.A.M.A., June 23, 1934): Dr. Greeley calls attention to the frequency of occurrence of calculi and describes their usual forms. The symptomatology varies. Colicky pain may occur periodically. There may be no pain for years. Pain is caused by retention of the saliva. This happens particularly at meals or at sight of food. Marked inflammation may occur. If the duct is occluded long and infection occurs, the swollen mass is painful and tender. Diagnosis is usually easy, but differential diagnosis is often necessary. There may be recurrence.

Focal Infection—Some Modern Aspects (R. L. Cecil, California & West. Med., June, 1934): Focal infection is one of most nearly universal of human ailments. The focus may occur almost anywhere. The most frequent sites are the mouth, pharynx and sinuses. Rosenow is quoted as saying that a focus is more menacing if under pressure as at root ends of teeth. Predisposing conditions are long illness, old age, exposure, excess of alcohol or drugs, poor personal hygiene, the presence of pulpless teeth and possibly a deficiency of vitamins. Exciting conditions are ordinary pathogenic bacteria, but more particularly a streptococcus form. Haden is quoted as authority for the statement that apical abscesses are caused in 92.5 per cent of cases by some form of streptococcus. Cases of experimental focal infection from dental root cultures, quoted at length, corroborate the thesis. The treatment is removal of the primary focus.

A Better Method of Treating Fractures of the Jaws (F. B. Moorehead, J.A.M.A., May, 1934): The author advocates elastic traction, which he uses in practically all cases when reduction is required. The article is one of illustration rather than argument. The method, with adaptation for individual cases, is advocated to handle varying types of fractures.

Decay of Teeth and Calcium Metabolism: To the Editor: A girl, aged 15 years, apparently has been on a perfectly well balanced diet all her life, and the blood calcium at the time is 11.1. In the last six months, several of her teeth have become decayed, and the enamel on her teeth is thinning out and losing its luster. Her dentist thought that she probably had some calcium deficiency, but her diet is adequate, and a check-up on the blood calcium proves that it is within normal limits. This is the second patient that I have had in this territory in the last two or three years with this complaint, and I am wondering whether you can give me any light on the question. E. M. Kersten, M.D., Fort Dodge, Iowa.

Answer.—The age of the patient is that of one of the periods of greatest susceptibility to dental decay coincidental with rapid growth and general readjustment of metabolism. A blood calcium of 11.1 mg. per hundred cubic centimeters of blood plasma is within the normal range, though toward the high side. This may be deceiving, as it is no assurance of a positive calcium balance, since the level of the blood calcium is presumably controlled by the parathyroid secretion and this favorable blood picture may be preserved by an active parathyroid

depletion of the calcium reserves in the bones rather than by ingestion from the gastro-intestinal tract. The high calcium level of the blood is rather suggestive under these circumstances of just such a condition. It is possible even with a "perfectly well balanced diet" that mineral metabolism is faulty and that absorption of calcium from the food is not proceeding rapidly enough to balance the demand for calcium for growth and that lost through elimination. In spite of many assurances to the contrary, it is debatable as to just how much this and similar cases may be benefited immediately by treatment, since the etiology of dental caries is not wholly clear. Because of great susceptibility to decay, extraordinary precautions should be taken. Frequent visits to the dentist and prompt filling of each cavity in such a way as to inhibit local recurrence, vigorous use of the mouth in chewing, careful attention to brushing the teeth each time after eating, and a diet well fortified with minerals and vitamins are recommended. Carbohydrates should be reduced to a level barely sufficient for energy requirements.—Queries and Minor Notes, *J.A.M.A.*, June 23, 1934.

Cavities in Deciduous Teeth: To the Editor: What is the consensus among the best dentists about filling cavities in deciduous teeth? If this is not the accepted procedure, what is? M. D., North Carolina.

Answer.—The constantly increasing demand for education on the part both of the public and of the dental profession has brought the problem of prevention of decay and all the ills that follow in its wake to a point at which the leaders in education agree that the whole solution centers on its early prevention. Evidence is at hand that school children develop more rapidly both mentally and physically if their mouths and teeth are regularly under the care of the dentist. The deciduous teeth should be retained until the permanent ones are ready to erupt, their roots being absorbed to accommodate them. If the deciduous teeth are taken out or are lost by decay before the permanent ones are ready to take their places, the arch becomes too narrow and irregularity follows. This can be corrected only by the orthodontist. The deciduous teeth should be filled as soon as decay appears. They should be kept clean by the systematic use of the toothbrush. If cavities in deciduous teeth are not filled, the child loses the use of the teeth, their pulps die, and abscess and destruction of the jaw bone follow. Adenitis results. Even tuberculous germs may enter glands through cavities in the teeth. Digestion is impaired, the child suffers pain, and impairment of the health and of development follows. There is no sane argument for allowing deciduous teeth to decay. Cavities should be filled as soon as they occur. Children should visit their dentist at least every six months and oftener if necessary. The consensus among the best dentists is that all deciduous teeth, when carious, should be filled and retained until the permanent ones are ready to take their places.—Queries and Minor Notes, *J.A.M.A.*, May 19, 1934.

Fluorine, Mottled Enamel and Senile Dental Decay: To the Editor: A man, aged 54, for the past eight years has been suffering a progressive loss of the enamel of his teeth. The beginning of this loss was approximately three months after he changed his residence and received his water supply from the same source but a different reservoir. I sent for an analysis of the water and find that it contains four parts of fluorine per million. For the last three years, the condition has become stationary, but the dentin is almost everywhere exposed. Physical examination shows a hypertension, with the blood pressure varying from 140 to 190 systolic. The functional kidney test, blood nonprotein nitrogen, calcium and phosphorus are normal. He has a beginning hepatic cirrhosis, as indicated by a slightly enlarged liver. The galactose tolerance test and indirect van den Bergh test are positive. The icterus index is 14.2. Repeated hemorrhage is probably from esophageal varices, as roentgenograms of the gastro-intestinal tract and lungs show nothing abnormal. I should be interested to know whether the fluorine content of the water is your account of this condition, or whether some other cause

should be searched for. Fred S. Modern, M.D., Los Angeles.

Answer.—Fluorine in the amount of four parts per million in the drinking water is ample to produce mottled enamel in developing teeth, but such teeth after eruption, if anything, are more resistant to dental decay and enamel destruction than the teeth of subjects who have not been exposed to the effect of fluorine. It is stated that even as little as 0.1 mg. of fluorine per kilogram of body weight taken by mouth daily may produce the symptoms of chronic fluorine poisoning, such as loss of weight, loss of appetite, cachexia and brittle bones, and this is in the lower range of what will cause mottled enamel. No other effects of chronic fluorine poisoning are listed (DeEds, Floyd: Chronic Fluorine Poisoning, *Medicine,* 12:1 [Feb.] 1933). The mouth conditions in this case, although incompletely described, do not at all resemble those found in the teeth of persons residing in mottled enamel districts. They bear a much greater resemblance to what is known as senile decay, a form of dental decay that is greatly aggravated by various types of degenerative disease. Under such conditions, even resorption of the tooth roots may take place (Mueller, Emil, and Rony, H. R.: *J.A.D.A.,* 17:326 [Feb.] 1930). Consequently, one is forced to the conclusion that the mouth conditions in this man are in part secondary to his systemic disease and that the fluorine in the water supply is without etiologic significance.—Queries and Minor Notes, *J.A.M.A.,* June 9, 1934.

Leukocyte Counts and Barbiturates: To the Editor: I feel that some comment should be made relative to the article of Hardwick and Randall that appeared in *The Journal,* May 12, page 1558. The authors studied the leukocyte counts of fifty-nine women who had been given pentobarbital sodium as an obstetric analgesic and concluded that the drug had no effect on the leukocyte count. I am in complete agreement with their conclusions, since I have also made the same observations relative to all types of the so-called barbiturates. The authors state, however, that "there has been some discussion in the literature recently concerning the possible relation between the administration of barbiturates and the production of granulocytopenia." Since I have just completed a review of the literature on this subject, I must state that the discussion has centered around the relationship to granulocytopenia of drugs containing the benzene ring and that the barbiturates have not been involved in this conception of the etiology of the disease. Pentobarbital sodium is a straight chain carbon compound, does not contain the benzene ring, and has never been suspected of being an etiologic factor, so far as I know, except possibly in the report of C. H. Watkins (*Proc. Staff Meet., Mayo Clin.,* 8:713 [Nov. 22] 1933). In my original publication on this subject in 1932 (*Am. J. Clin. Path.,* 2:11 [Jan.] 1932), I brought out the observation that eight of nine patients with granulocytopenia had taken drugs containing the benzene ring prior to the clinical onset, and in other publications (*U. S. Nav. M. Bull.,* 30:16 [Jan.] 1932; *Am. J. Clin. Path.,* 1:385 [Sept.] 1931), I brought out the same association and I wish to emphasize that in no instances have the barbiturates alone ever been suspected of an etiologic rôle in this disease. Hardwick and Randall state further, "Madison and Squier reported thirteen cases in which they think granulocytopenia was probably due to the use of benzene chain derivatives." It seems that they have misinterpreted the report of Madison and Squier, since these authors stressed the fact that their thirteen cases had been preceded by administration of a drug which contained the benzene ring and not a carbon chain. Since my first report on this subject, there have now accumulated over fifty cases of granulocytopenia in the American literature in which the clinical onsets were preceded by the administration of benzene ring drugs and, in no instance, with the exception of the report by Watkins, has the barbiturate group been incriminated. There are many preparations, of course, in which the barbiturates and the benzene ring drugs, such as allonal and amytal compound, are combined. Finally, I would like

to emphasize that my chief purpose in this communication is to call attention to the possible confusion that may exist as to the differences between these two classes of drugs. There has been much evidence accumulated to show that many cases of granulocytopenia are probably caused by the indiscriminate administration of benzene ring drugs, and more specifically by those containing the ring with an attached amine group (Kracke and Parker: *J. Lab. & Clin. Med.*, May, 1934). It seems especially indicated at this time that careful distinction should be made between the group of drugs containing the benzene ring and that group under the heading of "barbiturates" which do not contain the benzene ring. Roy R. Kracke, M.D., Emory University, Ga.; Prof. of Pathology, Emory University School of Medicine.—Correspondence, *J.A.M.A.*, June 9, 1934.

Rickets in Rats by Iron Feeding (J.A.M.A., June 23, 1934): Brock and Diamond produced rickets in rats by the addition of ferric chloride to a normal, nonrachitogenic diet. The rickets so produced, as judged by roentgenographic, microscopic and chemical studies, was qualitatively similar to, but more severe than, that produced by Steenbock's rachitogenic diet 2965. The addition of phosphorus to this ferric chloride diet prevented the occurrence of rickets. The chlorine radical of the ferric chloride has been eliminated as the rachitogenic factor by negative results from the addition of ammonium chloride to the nonrachitogenic diet. Similar rachitic changes have been produced by the addition of other iron compounds to the nonrachitogenic diet.

Experimental Bone Transplantation and Effect of Decalcification (J.A.M.A., June 16, 1934): Ghormley and Stuck studied the rate and the type of healing of grafts taken from bone of different regions and structures and the effect on the rate and the type of healing that could be produced by "decalcification" of experimental animals. Their experiments revealed that periosteal transplants in old animals do not produce new bone. Cortical transplants do not completely die, but unite slowly with the bone of the host, and decreased calcification is seen roentgenologically at the end of three months. Cancellous bone from the ilium or the tibia unites more rapidly and firmly than cortical bone. It gives roentgenographic evidence of increased calcification at the end of three months. Animals placed on a "decalcifying" diet until the time of the transplantation gave evidence of more active production of new bone round both the cortical and the cancellous transplants.

Irradiation in Trigeminus Neuralgia (J.A.M.A., June 16, 1934): In a case of refractory trigeminus neuralgia, Ausch resorted to treatment with the cold quartz lamp. In sixteen sessions, the rays were applied from the outside at the infra-orbital foramen, as well as intra-orally along the entire right maxilla. The final result was complete freedom from pain, which has persisted for more than a year. The author employed this method in more than twenty cases, and, on the basis of his observations, he concludes that the cold quartz lamp should always be tried before resort is had to alcohol injection or to a surgical intervention in trigeminus neuralgia. In July, 1933, the author's method was adopted by a clinic, and favorable results have been corroborated. He admits that ultraviolet irradiation in cases of trigeminus neuralgia is not new as such. The new aspect of his method is that the cold quartz lamp makes it possible to approach the second and third branches of the trigeminus from the oral side. The burner of the cold quartz lamp can be brought into direct contact with the mucous membrane.

Action of Saliva on Blood Coagulation and Wound Healing (Clinical and Experimental Study of the Action of Saliva on Blood Coagulation and Wound Healing in Surgery of the Oral Cavity and Throat) (M. S. Ersner, D. Myers and W. Ersner, J.A.M.A., June 2, 1934): The Ersners and Myers show that saliva, when added to blood *in vitro*, produced in numerous trials a reduction of a blood coagulation time of from ten to fifteen minutes to from two to three minutes. The saliva, whether autogenous or exogenous, mixed from various individuals, centrifugated, with supernatant fluid or the sediment, has the same effect in

a reduction of the coagulation time. Saliva that has been kept on ice from twenty-four to forty-eight hours or at room temperature for this length of time has the same effect in decreasing the coagulation time, showing again that whatever agent is present does not become inert. Saliva, after continued stimulation (petrolatum chewing), retained its coagulating power and the p_H of the saliva did not vary. Filtered saliva possesses the same coagulant action as whole saliva. The authors suggest that patients who are to undergo an operation be given sodium bicarbonate to neutralize gastric acidity and petrolatum to chew, or some other inert substance that will stimulate the salivary secretion, and be made to swallow this saliva, so that its presence will alkalinize the gastric contents as well as promote blood coagulation.

Foreign Literature

Synthetic Fillings (G. N. Groves, D. Rec., June, 1934): Grove mentions the disadvantages of the synthetic filling, its short life, its transient good looks, its erosion or scaling, its injury to the pulp. He compares it with gold, porcelain, amalgam and oxyphosphate cement and concludes that silicate only has made esthetic, conservative treatment possible. The translucent filling has done more for dental conservation methods than school clinics, health lectures and dental propaganda. Patients are led to visit the dentist more often by a disfiguration than by the presence of a putrescent molar. The public demands and the dentist must meet the demand. In the old days, the pulp died under cohesive gold fillings if they were too deep. But heat conduction is not a concern with silicate. The author states that free acid is given off by silicate more than by oxyphosphate. He doubts the ability of varnish to counteract it. Also there is the difficulty of placing it satisfactorily and the danger of destruction from penetration. He suggests a base of oxyphosphate, and considers too the various degrees of success with the material and their possible causes. He insists on the dry cavity, the proper moment of insertion, necessary time to harden before allowing moisture to touch it and the needlessness of polishing.

Movements of Teeth (J. G. Turner, Brit. D. J., June 15, 1934): The author classifies the forces by which teeth are moved as intrinsic and extrinsic. He says the bone moves and carries the teeth; that movements other than those of eruption are another matter. The movements commonly known as drift he repudiates. There is no such a thing as a general drift of teeth toward the middle line. Both intrinsic and extrinsic forces are active only during the growing period. There is an intimate connection between the existence of tonsils and adenoids and the growth of the maxilla. The common deformities of the dental arches are the result of arrest of development of the maxilla.

Diet and the Nerve Supply to the Dental Tissues (May Mellanby and J. D. King, Brit. D. J., June 1, 1934): The authors say that perfect development of the hard tissues depends not so much on the amount or ratios of calcium and phosphorus as the presence of vitamin D. The work is mainly summarized as follows: Vitamin A deficiency results in epithelial hyperplasia, gingivitis and periodontal disease. With an adequate supply of vitamin A or carotene, these tissues remain healthy and normal. Degeneration of the maxillary and mandibular division of the fifth nerve has been observed in animals fed a vitamin A deficient diet. Again, addition of vitamin A or carotene prevents such lesions. It is suggested that loss of neurotrophic control owing to vitamin A deficiency may be partly responsible for pyorrhea and other periodontal diseases and even dental caries.

Artificial Larynx (Dr. Pont, Rev. Odontol., May, 1934): The presence of cancer of the larynx requires either a total or a partial laryngectomy. Enough of the vocal cords may remain to make it possible for the patient to talk and make himself understood. However, when the larynx is totally removed, the patient must either wear a vocal apparatus or go through a difficult period of reeducation. The author has perfected an apparatus which he believes will be helpful to many persons deprived of their

vocal cords. It is practically invisible and it is not difficult to wear, with the added advantage of not being costly. The voice is reestablished to practically its normal condition and the wearer of the apparatus can control its mechanism without difficulty.

Frequency of Grave Infections of Bucco-Dento-Pharyngeal Origin (G. Etienne and M. Verain, Bul. de l'Acad. de Med., Nov. 7, 1933): The authors present three cases of general infection resulting from activity affecting the teeth, the mouth and the pharynx, which they have observed within a period of three months. The first is a case of pulmonary infarct with pulmonary abscess following the removal of adenoids. The second is a case of malignant streptococcic endocarditis after a dental extraction, and the third, an acute septicemia with hemolytic streptococci after the patient pricked her gums with a needle. The aim of the authors is to point out the frequency of these accidents following operations in infected mouths and throats. General infections occur sufficiently often to make them believe that they are common complications. When surgical intervention occurs in the presence of infected foci, modifications of technic should be made in order to prevent the spread of infection throughout the body by way of the blood stream. All danger will probably not be avoided, but the risks will certainly be reduced.

Hemorrhages in Odontology (Ermando Gatto, La Stomatologia, April-May, 1934): The author suggests several reasons for the occurrence of hemorrhage after the extraction of teeth. Hemorrhages may be local in origin (inflammation of gums, of periosteum, alveolar fracture, etc.), or they may be the result of a general condition resulting from an infectious disease. They may occur in conditions of avitaminosis, in nervous diseases or in obesity. The patient may be the victim of a hemorrhagic diathesis. Before an extraction is made, a careful study of the patient's history is advised. In cases of hemophilia, extraction should be undertaken only as a last resort. The author reviews the various methods of therapy of dental hemorrhage and suggests preparations for local use and procedures for improvement of technic. General therapy varies according to the pathogenesis of the hemorrhage. The indications for blood transfusions are given.

Focal Infection: I: Are All Periradicular Granulomas Infected? (B. Mela, Stomatologie, May, 1934): The author has studied the bacterial contents of fifty periradicular granulomas which were extracted intact with the point of the root to which they were attached. Of these, nine were sterile, while the others contained strains of streptococci of various types. The bacterial content of fifteen of these granulomas was inoculated directly into the circulation of guinea-pigs with the purpose of studying quantitative distribution in the different organs. In five cases, the bacteria were found in the blood of the animals twenty-four hours after inoculation. In six cases, the bacteria were no longer to be found either in the blood or in the organs. The author never found the bacteria accumulated in or exclusively in a single organ.

MISCELLANY

BOOK REVIEW

Zahnfleischentzundung und Zahnlockerung. By Drs. B. Gottlieb and B. Orban, Berlin: Berlinische Verlagsanstalt. Price, $7.

It is by this time a well-recognized fact that the tremendous impulse which has been given histopathologic research within recent years dates from the advent of Dr. Bernhard Gottlieb and his diligent co-workers in the field. During the last fifteen years, a large amount of work has been done and reported from their laboratory in Vienna. A large portion of this work has been concerned with problems which are directly involved in the dental disease known as alveolar pyorrhea. During this period, a

great deal of highly controversial material has of course been published. As a result, there still exists a great deal of confusion in the minds of those who have not followed or been able to follow very conscientiously the material as it has been published. Therefore, the authors have very aptly chosen this time to summarize and publish in book form all that is known to them on this very live subject. The book is divided into nine chapters. The first three are in a way introductory to the study of alveolar pyorrhea; yet they contain a great portion of the meat of the entire book. Whether one does or does not subscribe to the conception of continuous eruption as developed by the Vienna school, it is imperative that one know the facts concerned with the wide variation that takes place in the so-called normal behavior of the investing tissues. The authors have conclusively shown, with illustrations from models, gross specimens and histopathologic sections, that we are, throughout life, confronted with a wide variation of important changes in the normal dentures. These are chiefly: mesial movement of all teeth, occlusal movement of all teeth, recession apically of all the investing tissues, abrasion, tooth loss and its effects on adjacent as well as occluding teeth, lack of function in some teeth and increased function in others, etc. This conception, as here developed, is positively indispensable for a correct appraisal of pathologic processes, which are usually superimposed on many of these normal changes.

In Chapter III, illustration 104, the authors emphasize a very important fact, namely, the variations in length of teeth of different individuals. It is stated that "the usefulness of teeth is dependent upon the length of their clinical roots." In attempting an appraisal of the probable prognosis of any treatment, this fact becomes all-important.

In the two succeeding chapters, the actual disease is discussed. Dr. Gottlieb and his pupils have always approached the problem on the supposition that the bulk of the cases of so-called pyorrhea are caused by lack of dental hygiene. They have, therefore, called these cases filth pyorrhea. In contrast, they have called those cases that are not of filth origin paradental pyorrhea and diffuse atrophy. To the clinician they offer a very practical method for differential diagnosis; viz., whenever chronic inflammation is encountered about the investing tissues of the teeth, poor mouth hygiene should be suspected. The mouth should be cleaned up and the patient instructed as to proper care. If the condition responds readily, the assumption of filth pyorrhea is justified. If the case does not respond to this treatment, although one is positive that the patient is doing his part, it is quite clear that something more than poor hygiene and filth pyorrhea are present. Such cases are not large in number and have their origin in some systemic disturbance. They require systemic treatment.

In Chapter VII, traumatic occlusion is evaluated and put in its proper place. The remaining chapters are devoted entirely to intensely important discussions of treatment, including the proper method of brushing teeth, scaling, surgical excision of gingival flaps, Dunlop oxygen, fixation of treated teeth and factors in making partial restorations after the loss of teeth from pyorrhea.

The authors have avoided the introduction of controversial material and have confined themselves to the description of their own findings and their own procedures. They have succeeded admirably in simplifying a subject which has been confused almost universally by the introduction of a complicated system of nomenclature. The book is indispensable to research workers and clinical practitioners alike. In addition to being research men, the authors are practical dentists. The illustrations throughout the book are excellent. All important statements are amply backed by histopathologic evidence. To followers of the Vienna School, this book is essential. To others, it offers an opportunity to become informed as to the teachings of this school. Dental research has been enriched by this outstanding work. The authors deserve unlimited praise for their contribution to the field of research and clinical practice.

EMIL MUELLER.

NEWS

CALIFORNIA

Joint Meeting: At a joint meeting of the Solano County Medical Society and the Napa-Solano County Dental Association, May 8, in Vallejo, Anthony B. Diepenbrock, M.D., and Bertram F. Coleman, D.D.S., San Francisco, discussed focal infection.

Annual Session: "Best attended and most elaborate" was the thirty-seventh annual session of the Southern California State Dental Association, held June 4-6, in Los Angeles. The constitution and by-laws of the association were altered to (1) make the office of editor appointive, (2) provide for the publication of the journal, (3) facilitate the blending of the annual meeting of 1935 with that of the Pacific Coast Dental Conference, (4) relieve honorary members not practicing dentistry in California of paying dues to the S.C.S.D.A., (5) create a by-laws and a public relations committee and (6) alter the apportionment of councilors to pave the way to a subdivision of the Los Angeles County component into geographic districts. An amendment to allocate to the Council the duty of nominating a slate for the annual election of officers was recommitted. The president, C. M. Alderson, installed Harry Hancock as president for 1934-1935. All but one component reported increased membership in 1934, with San Diego leading, with a gain of more than 20 per cent.

FLORIDA

Dr. Wielage and Mrs. Wielage Honored by Research Group: A group of research associations representing twenty-five different states, i.e., the American Otological Society, American Laryngological, Rhinological and Otological Society, Harvard Medical School, Brigham Hospital, Boston, University of Pennsylvania Post-Graduate Medical School and others interested in dealing with the problems underlying dental decay, desiring a research dentist to work with them have extended an invitation to M. Francis and Mrs. Ada Wielage.

Dental Hospital Staff Meets: The dental staff of Jackson Memorial hospital held its regular meeting May 7. L. H. Finn was unanimously elected secretary after the resignation of B. L. Wilkerson, who is now president of the Miami Dental Society.

ILLINOIS

United Medical Service, Inc., Sued: Quo warranto proceedings were instituted, May 12, in the Superior Court, Cook County, by the attorney general of Illinois, questioning the right of the United Medical Service, Inc., 23 East Jackson Blvd., to engage in the corporate practice of medicine under the provisions of the medical practice act of Illinois. The United Medical Service, Inc., was organized as an Illinois corporation and chartered, Dec. 15, 1930, with an authorized capital stock of $40,000. Joseph G. Berkowitz, M.D., former director of the Public Health Institute, is president of United Medical Service, Inc.

INDIANA

Board of Trustees: Three new members of the Board of Trustees of the state dental association are: Robert L. Foster, representing the Indianapolis Dental Society; J. H. Kraning, of Monticello, representing the West Central Branch, and W. C. Boren, of Princeton, representing the First District Dental Society. The following officers were elected by the trustees for respective terms of one year: secretary, A. R. Ross, Lafayette; treasurer, William Bogie, Vincennes.

IOWA

New Bulletin: At the suggestion of the Publication Committee, a special committee composed of Drs. Bryan, Conzett, Volland, Forney, Hildebrand, Pool, Coy, Henkin, Dow and Humiston was appointed to study the *Iowa Dental Bulletin* and outline its policy for the future. All of the problems confronting the Publication Committee

were placed before them with the result that definite plans were formulated to govern the Publication Committee and the editor in carrying on the bulletin.

State Society Meets: The recent meeting of the state dental society drew over 70 per cent of the membership. The following men were recommended to the governor for the vacancy on the state board of dental examiners: Earl H. Ford, Des Moines; H. D. Coy, Hamburg; Harry E. Hanson, Cedar Rapids; H. G. Bolks, Sioux City; W. H. Chapman, Burlington, and H. M. Ehred, Forest City. Twenty-eight men who have been loyal members for twenty-five consecutive years were elected to life membership.

Cedar Rapids Society Meets: At the Cedar Rapids Dental Society meeting held May 21, J. H. Calder presented the past president's jewel to C. S. Foster, retiring president. An honorary life membership in the local society was awarded to W. D. Patterson, who has practiced in Cedar Rapids for fifty-five years. C. V. Lehman, of Cedar Rapids, will continue as chairman of the Federal Relief Committee of the Iowa State Dental Society, being chosen by the executive council of the society.

MARYLAND

Dr. Brotman Addresses Medical Group: The Maryland Academy of Medicine and Surgery was addressed in Baltimore, May 15, among others, by Robert H. Brotman on "Dental Facts for the Physician."

MICHIGAN

Resolutions Adopted by the Michigan State Dental Society: WHEREAS, THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION is the official organ of the Association and organized dentistry;

WHEREAS, the advertising policy of THE JOURNAL is conducted on the highest standard for the benefit and protection of the dental profession and the public;

WHEREAS, the said JOURNAL deserves the whole-hearted and substantial support of every member of organized dentistry; and

WHEREAS, the Beneficial Circle Plan was created for the purpose of stimulating interest in and obtaining further financial support for THE JOURNAL, having as its ultimate aim the procurement of additional funds through the sale of legitimate advertising space to be used for the dental education of the public through the Bureau of Public Relations; be it

RESOLVED, that the Michigan State Dental Society urge its membership to consistently support THE JOURNAL in every way and use and recommend the products of those firms advertising in THE JOURNAL; be it further

RESOLVED, that the society record its approval of the Beneficial Circle Plan; and be it further

RESOLVED, that copies of this resolution be forwarded to the Officers and Trustees of the American Dental Association, to the Editor of THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION and to the secretary of the Michigan State Dental Society for publication in the journal.

Dr. Madison Resigns: Gerald Madison requests the announcement of his resignation from the staff of the University of Detroit Dental College.

Dr. Hoyer Honored: F. F. Hoyer of Owosso, dean of the dental profession in Shiawassee County and one of the oldest dental practitioners in the state, was tendered a testimonial dinner, May 17, in honor of his fifty-four years in active dental practice. The dinner was given by the Shiawassee County Dental Society and the Central Michigan District Dental Society.

MINNEAPOLIS

Membership Drive: As a result of the good work done by the Membership Committee, 93 per cent of the dentists in Wright County are now members of the dental society.

NEW YORK

Epidemic of Vincent's Infection: More than 500 cases of Vincent's infection have occurred during the past three months in the village of Dansville, and cases have also been found in Geneseo, Livonia and rural areas in Livingston County. According to the state health department, the majority

of cases have been typical clinically, the disease being characterized by fairly extensive ulceration of the oral or pharyngeal mucous membrane, sometimes accompanied by fever and constitutional symptoms. A few patients have been seen with symptoms like those of bronchitis. About two-thirds of those attacked are school children. The Livingston County laboratory has records of positive throat smears from 443 persons, all of whom are said to have the disease. The local health officer has taken active steps toward the control of the outbreak and has informed the public regarding it through the newspapers. The village board of Dansville has appropriated funds for neo-arsphenamine to be used in treating patients who are unable to pay for treatment with this drug.

TEXAS

Annual Postgraduate Assembly: The First Annual Postgraduate Assembly of the Texas Dental College Alumni Association was held at the college for three days, beginning Monday, May 28. About eighty men from all parts of the state were present.

WASHINGTON, D. C.

Miss Abbott Resigns: Miss Grace Abbott, for thirteen years chief of the children's bureau, Washington, D. C., has announced her resignation, which was effective July 1. Miss Abbott will go to the University of Chicago to become professor of public welfare administration.

WASHINGTON

Public Health Association Formed: Following a public health institute held at Washington State College, Pullman, May 4-5, the Washington State Public Health Association was formed, with Erval R. Coffey, state health officer, as the first president. Among the speakers at the institute were James E. Drake, Spokane, who spoke on control of diphtheria in public schools, and Holland E. Wight, Yakima, who spoke on oral hygiene. Platt W. Covington, field representative of the Rockefeller Foundation, was the speaker at a dinner meeting.

WISCONSIN

State Meeting: At the 1934 meeting of the Wisconsin State Dental Society, the attendance was the largest in the history of the society, more than 700 being registered.

H. P. Landry on State Board: May 29, Governor Schmedeman announced the appointment of H. P. Landry, Cadott, to membership on the state board of dental examiners, to succeed W. I. Macfarlane, Tomahawk, for the term ending May 2, 1939.

State Society House of Delegates: The first House of Delegates of the Wisconsin State Dental Society convened at Milwaukee, June 10, pursuant to call issued by G. E. Morgan, state society president, thus opening a new chapter in the history of the state society.

Dental Assistants' Association: The fourth annual meeting of the Wisconsin State Dental Assistants' Association was held in conjunction with the Fox River Valley Dental Society meeting, May 21, at Oshkosh.

FOREIGN

Settlement of Jews in Palestine: The problem of finding employment for Jewish practitioners of medicine and dentistry from Germany, who, by reason of racial exclusion, continue to seek refuge in other countries, is still difficult to solve. In most civilized countries, restrictions of practice are in force, and, in Palestine, whatever facilities there may be for ordinary settlers, the prospects of an immigrant doctor or dentist would be exceedingly limited if the figures quoted by the chief secretary may be taken as correct. He points out that while England has one doctor for every 1,300 of the population, and Switzerland one for every 3,000, "Palestinian Jewry already has one for every 226," and probably the ratio of dentists would be as ample. No reference is made to the remaining population, which is no doubt to some extent provided for in other ways. It is proposed to

impose restrictions on the admission of Jewish members of the profession, and these statistics were furnished in reply to a protest by a delegation from those who would be affected by this embargo.—*Brit. D. J.*, June 15, 1934.

Radiographers Required to Be Doctors: A new law pertaining to the practice of medicine will require the possession of a doctor's diploma in order to practice radiography and radiotherapy. Heretofore, the radiographic laboratories in the hospitals have been under the direction of specialists who are not graduate physicians. Their number was small, dating for the most part from the beginning period of the use of roentgen rays. Many of these men have adapted themselves to this work in a remarkable manner. Occasionally, however, examples of fraud in the form of "trick films," in connection with claims following occupational accidents, have been discovered. Physicians have for some time shown displeasure at the rôle assumed by nondiplomaed radiographers, whom they have charged with a lack of knowledge of anatomy and with not always knowing what part of the body merited particular attention for the establishment of a diagnosis. With regard to treatment, this constituted, it was pointed out, the illegal practice of medicine and entailed serious risks for the patients. As the result of demands made by the medical syndicates, parliament inserted this regulation in the new law. Nondiplomaed hospital radiologists appointed more than thirty years ago, and who have won the respect of physicians by the meritorious quality of their services, are to be admitted to registration.—Paris Letter, *J.A.M.A.*, June 16, 1934.

Deaths

Barnhart, Harry C., San Diego, Calif.; Temple University School of Dentistry 1890; died, April 13.

Bosler, Simon F., Rockport, Ind.; died April 22; aged 76.

Brackett, Philip C., Portland, Maine; The Thomas W. Evans Dental Institute, 1913; died recently.

Burke, Gordon L., Owensboro, Ky.; Northwestern University Dental School, 1904; died, July 1.

D'Argy, L. A., Waterville, Maine; Baltimore College of Dental Surgery, 1904; died recently.

Hart, E. J., Madison, Wis.; Chicago College of Dental Surgery, 1902; died, April 1; aged 76.

Hendricks, Peter, Glendale, Calif.; University of Louisville College of Dentistry, 1899; died recently; aged 68.

Jameson, Alexander, Indianapolis, Ind.; Philadelphia Dental College, 1887; died, May 19.

Long, Walter M., Moline, Ill.; University of Iowa College of Dentistry, 1924; died, July 8, from a heart attack; aged 59. Dr. Long formerly practiced in West Liberty and Clinton, Iowa.

Lynott, Nicholas J., Belleville, Ill.; Washington University School of Dentistry, 1906; died, May 12; aged 50.

Maguire, James O., Dubuque, Iowa; University of Minnesota College of Dentistry, 1896; died, May 28; aged 58.

Monson, Hollis G., Portland, Maine; Thomas W. Evans Dental Institute, 1911; died recently.

Penn, W. A., Council Bluffs, Iowa; Chicago College of Dental Surgery, 1892; died, April 4; aged 56.

ANNOUNCEMENTS*

CALENDAR OF MEETINGS

American Dental Association, St. Paul, Minn., August 6-10.

American Academy of Periodontology, St. Paul, Minn., August 2-4.

American Association of Dental Editors, St. Paul, Minn., August 4.

American Board of Orthodontia, St. Paul, Minn., August 6-10.

*Announcements must be received by the fifth day of the month in order to be published in the forthcoming issue of THE JOURNAL.

American Association for Advancement of Oral Diagnosis, St. Paul, Minn., August 6.

American Congress of Physical Therapy, Philadelphia, Pa., September 10-13.

American Full Denture Society, St. Paul, Minn., August 4-5.

American Public Health Association, Pasadena, Calif., September 3.

American Society for the Promotion of Dentistry for Children, St. Paul, Minn., August 6.

American Society of Oral Surgeons and Exodontists, St. Paul, Minn., August 3-4.

Association of American Women Dentists, St. Paul, Minn., August 6.

Dental Editors Club, St. Paul, August 5.

Mid-Southern Postgraduate Dental Clinic, Memphis, Tenn., October 22-24.

Montreal Dental Club Clinic, October 18-20.

New York Dental Centennial, New York City, December 3-7.

Society for Advancement of General Anesthesia in Dentistry, New York City, third Monday in February, April, October and December.

District of Columbia at George Washington University, Washington, D. C., second and fourth Tuesdays in each month from October to June, inclusive.

American Dental Assistants Association, St. Paul, Minn., August 6-10.

American Dental Hygienists' Association, St. Paul, Minn., August 6-10.

STATE SOCIETIES

May

Illinois, at Quincy (14-16)

STATE BOARD OF DENTAL EXAMINERS

Indiana, at Indianapolis, October 29-November 2. J. M. Hale, Mt. Vernon, Secretary.

Iowa, at Iowa City, December 17-20. Hardy F. Pool, Mason City, Secretary.

New Jersey, at Trenton, December 3-8. John C. Forsyth, 148 W. State St., Trenton, Secretary.

ILLINOIS STATE DENTAL SOCIETY

The seventy-first annual meeting of the Illinois State Dental Society will be held at Quincy, May 14-16, 1935.

BEN H. SHERRARD, *Secretary*,
300 Rock Island Bank Bldg.,
Rock Island, Ill.

INDIANA STATE BOARD OF DENTAL EXAMINERS

The Indiana State Board of Dental Examiners will hold its next regular session for examination purposes in the Indiana University School of Dentistry Building in Indianapolis, beginning October 29, and continuing four days. Application and all proper credentials should be filed at least ten days before date of examination, complete in every detail. Address all communications for application blanks, information and further particulars to

J. M. HALE, *Secretary*,
Mt. Vernon.

NEW JERSEY STATE BOARD OF REGISTRATION AND EXAMINATION IN DENTISTRY

The State Board of Registration and Examination in Dentistry of New Jersey will hold its midwinter examination in Trenton, commencing December 3 and continuing five days thereafter. Examination fee, $25; reexamination, $10. The applicant must present to the board a certificate from the commissioner of education of the state, showing that he or she has obtained an academic education consisting of a four-year course of study in an approved high school or the equivalent thereof. The preliminary application must be filed with the secretary before September 2 and the final application form must be filed before November 24. The statutory examination fee of $25 must accompany the preliminary application when filed. Address all communications to

JOHN C. FORSYTH, *Secretary*,
148 W. State St.,
Trenton.

IOWA STATE DEPARTMENT OF HEALTH

The next examination of applicants to practice dentistry in Iowa will be held at

the State University of Iowa College of Dentistry, Iowa City, December 17-20. Applications together with college diploma and fee of $25 must be filed with the state department of health at least fifteen days prior to date of examination.

HARDY F. POOL, *Secretary,*
Mason City.

DENTAL EDITORS CLUB

The Dental Editors Club will meet in the Tahitian Room of the Hotel Lowry, August 5, at 9:30, for breakfast, after which a program of essays will be presented, followed by a business meeting. Carl Jones, editor of the *Minneapolis Journal,* will speak on "Freedom of the Press"; J. A. Meyers, editor of the *Journal-Lancet,* on "Medical Journalism," and R. M. Hewitt, of the Mayo Clinic, on "Editorial Technic."

J. O. MCCALL, *President,*
R. N. DOUGLAS, *Secretary.*

AMERICAN ASSOCIATION OF DENTAL EDITORS

The American Association of Dental Editors will meet August 4 in the Colonial Room of the Hotel Lowry, St. Paul, Minn., at 9:30 a.m., when the following program will be presented:

Welcome to members, by the president, William R. Davis, Lansing, Mich.

"Graphic Arts and Engravers Codes and Their Effects on Editing and Publishing Costs," by J. R. Bruce, president of the Bruce Publishing Co., St. Paul. (Mr. Bruce will also present a comparison between medical and dental journals.)

"Editorial Writing," by Leo Owens, publisher of the *St. Paul Dispatch.*

"Dental Therapeutics and Dental Journalism," by Harold S. Smith, Chicago, chairman of the Council on Dental Therapeutics.

"Ideals of Dental Journalism," by Fred A. Keyes, Boston, Mass., editor of the *Apollonian.*

"Evolution of Dental Journalism," by Albert L. Midgley, Providence, R. I.

At 2:30 p.m., the President of the American Dental Association, Arthur C. Wherry, will speak to the association, after which a business session will be held, with reports of committees, election of officers, etc. At 7 p.m., a banquet will be served in the Colonial Room, with Kenneth Olson, of the Department of Journalism of the University of Minnesota, as after dinner speaker; subject, "A Newspaper Man Looks at Dental Journalism."

WALTER HYDE,
THOMAS P. RYAN,
Committee on Arrangements.

EXAMINATION FOR APPOINTMENT IN THE DENTAL CORPS, U. S. ARMY

There will be an examination for appointment in the Dental Corps, U. S. Army, October 1-6. To be eligible to take this examination, an applicant must be a citizen of the United States; a graduate of a recognized dental school; in good standing in his profession; between the ages of 22½ and 31 years and nine months at the time of the examination, and must have been engaged in the practice of his profession for at least one year and eleven months subsequent to date of graduation. Examinations will be held at Washington, D. C., Denver, Colo., San Francisco, Calif., and San Antonio, Texas. Applicants who qualify during this examination will be eligible for appointment to vacancies occurring in the Dental Corps, Regular Army, during the fiscal year ending June 30, 1935. Application forms may be obtained at any military post or station, or from the Adjutant General of the Army, Washington, D. C.

LIBRARY BUREAU

HOSPITAL DENTAL SERVICE

Jan. 1924—June 1934

Armbrecht, E. C. — Importance of oral hygiene in hospital. West Virginia Med. Jour. 29:76-78 Feb. 1933.

Bartlett, D. C. — Care of psychotic patients. Vet. Admin. 9:78-82 July 1932.

Bartlett, D. C. — Operative care of mental cases. Jour. A.D.A. 19:1755-1760 Oct. 1932.

Bluestone, E. M. — Dental clinic—an asset and an obligation. Mod. Hosp. 33:89-93 Sept. 1929.

Brown, J. L. — Institutional policies as applied to a year's dental activities. U. S. Nav. Med. Bull. vol. 25, no. 2, 1927.

Civen, O. I. — Value of hospital and clinic experience. Dental Students' Mag. 5:19-20 Apr. 1927.

Cohen, M. — What constitutes efficient dental service in a hospital. Dental Items Interest 48:421-424 June 1926.

Douglas, A. F. — Dental service in the Florida State Hospital. Jour. A.D.A. 21:909-916 May 1934.

Ersner, W. — The dentist at the bedside. Monthly Bull. Dept. Pub. Health City of Philadelphia vol. 12 Dec. 1927: also Dental Roster 1:13-21 Mar. 3, 1928.

Franken, S. W. A. — Dental care of hospital in-patients: the Lenox Hill Hospital plan. Dental Cosmos 67:603-606 June 1925.

Franken, S. W. A. — Dental equipment: its cost and installation in a general hospital. Dental Cosmos 69:186-189 Feb. 1927.

Franken, S. W. A. — Dental internships in general hospitals of United States, Canada and Philippines. Jour. A.D.A. 15:768-776 Apr. 1928.

Franken, S. W. A. — Dental service in hospitals—its problems and their solution. Jour. A.D.A. 16:2302-2308 Dec. 1929.

Franken, S. W. A. & Sauer, G. F. — General hospitals offering dental internships: preliminary report. Dental Cosmos 69:297-302 Mar. 1927.

Franken, S. W. A. — Hospital dental service in the outpatient clinic. Jour. A.D.A. 19:696-701 Apr. 1932.

Franken, S. W. A. — Lenox Hill Hospital plan for dental care of hospital patients. Jour. A.D.A. 12:1243-1246 Oct. 1925.

Franken, S. W. A. — Lenox Hill Hospital plan for dental care of hospital patients. Jour. A.M.A. 83:1866-1868 Dec. 6. 1924.

Franken, S. W. A. — Oral care of hospital student nurses. Dental Cosmos 72:865-868 Aug. 1930.

Franken, S. W. A. — Prophylaxis of postoperative pneumonia by oral hygiene. Arch. Int. Med. Dec. 1931: ab. Jour. A.D.A. 19:1258-1259 July 1932.

Franken, S. W. A. & Sauer, G. F. — Should dentists have hospital internships? Jour. A.D.A. 19:2203-2211 Dec. 1932.

Goldberg, H. A. — Making a place for dental department. Mod. Hosp. 26:508-509 June 1926.

Hamilton, R. J. — Dental clinics. Med. Bull. Vet. Admin. 8:397-398 May 1932.

Hagerty, J. P. — Hospital dental service and medical care. Hosp. Progress 13:425-426 Nov. 1932.

Harper, J. P. — Dental service in relation to medical care. Hosp. Progress 13:380-381 Oct. 1932.

Internship in dentistry. (Ed.) Dental Cosmos 76:579-583 May 1934.

Jackson, J. A. & Meyers, N. J.	Dental infection and its relation to mental disease. Med. Jour. & Rec. 129:687-689 June 19, 1929.
Johnson, A. M.	Dental interns. Dental Digest 34:425-426 June 1928.
Kendall, F.	The hospital—a community dental health center. Jour. Amer. Dental Hygienists' Assn. 8:3-7 Apr. 1934.
Killip, M. H.	Cook County dental clinic. Oral Hygiene 15:1236-1245 July 1925.
Lynch, D. F.	Dental internship in a general hospital. Jour. A.D.A. 18:326-366 Feb. 1931.
Lynch, D. G.	Hospital internships for dentists. Jour. A.D.A. 19:966-975 June 1932.
Rosenthal, G. L.	Hospital service for dental graduate. Dental Cosmos 67:658-660 July 1925.
Seldin, H. M.	Hospital dentistry. Dental Cosmos 75:885-889 Sept. 1933.
Sostrin, S. Z.	Preventive dentistry and bedside service in hospital practice. Jour. A.D.A. 14:2120-2123 Nov. 1927.
Sperber, I. J.	Coordinated and standardized dentistry for state hospitals. Psychiatric Quart. 6:30-39 Jan. 1932.
Tanchester, D.	Stomatologic service in the hospital. Amer. Dental Surg. 48:352-353 July 1928.
Tennent, E. H.	Dental department, United States Naval Hospital, Philadelphia. U. S. Nav. Med. Bull. 22:408-415 Apr. 1925.
Tracy, W. D.	Organizing the dental clinic. Mod. Hosp. 26:361 Apr. 1926.
White, P. G.	Group practice in the navy. Oral Hygiene 15:1032-1034 June 1926.
White, P. G.	New dental ward, Naval Hospital, Norfolk, Virginia. U. S. Nav. Med. Bull. 22:433-436 Apr. 1925.
Winter, Leo	Dental department as an integral division of modern hospital. Bull. Second District Dental Soc. 18:18-20, 21 Feb. 1933.
Ziele, W. S.	Value of hospital experience to dental graduates. Dental Jour. of Australia 4:735-737 Dec. 1, 1932.

PAMPHLETS

Leuck, Miriam S.	Further study of dental clinics in the United States. Chicago, University of Chicago Press, 1932.
Leuck, Miriam S.	Study of dental clinics in the United States: 1930. Chicago, University of Chicago Press, 1932.
United Hospital Fund, Committee on Dispensary Development	Dental service in hospitals and clinics. New York, United Hospital Fund, 1925.

The Dental Creed

From time to time, inquiries have come in regarding a dental creed. In this month's issue of The Journal, a creed will be found among the editorials. If there are a sufficient number of requests for it, this creed will be printed, on parchment-like paper in artistic type with an illuminated initial letter, and autographed by the author, the whole to be in a form suitable for framing; price, fifty cents.

Those who have a copy of the tribute to orthodontia would find this creed similar in form and harmonious with that editorial. There are still a few copies of the latter to be had; price, fifty cents; illuminated initial letter in green or red as preferred. Address Library Bureau, A.D.A., 212 East Superior Street, Chicago, Ill.

OFFICERS AND TRUSTEES OF THE AMERICAN DENTAL ASSOCIATION
1933-1934

PRESIDENT

Arthur Cornelius Wherry.....First Nat'l Bank Bldg., Salt Lake City, Utah

PRESIDENT ELECT

Frank M. Casto.....1336 B. F. Keith Bldg., Cleveland, Ohio

VICE PRESIDENTS

C. J. Caraballo.....713 Stovall Bldg., Tampa, Fla.
Albert Hallenberg.....Fargo, N. D.
H. E. Harvey.....Navy Department, Washington, D. C.

SECRETARY

Harry B. Pinney.....212 E. Superior St., Chicago, Ill.

TREASURER

R. H. Volland.....First Capitol Nat'l Bank Bldg., Iowa City, Iowa

BOARD OF TRUSTEES

Arthur Cornelius Wherry, President, Ex-Officio.....
.....First Nat'l Bank Bldg., Salt Lake City, Utah
Frank M. Casto, President Elect, Ex-Officio.....
.....1336 B. F. Keith Bldg., Cleveland, Ohio
Harry B. Pinney, Secretary, Ex-Officio.....212 E. Superior St., Chicago, Ill.
R. H. Volland, Treasurer, Ex-Officio.....
.....First Capitol Nat'l Bank Bldg., Iowa City, Iowa
Harvey J. Burkhart, '36.....Box 35, East Avenue P. O., Rochester, N. Y.
C. R. Lawrence, '36.....730 Bass Bldg., Enid, Okla.
Herbert C. Miller, '36.....E. 6th and Oregon Sts., Portland, Ore.
W. H. Robinson, '36.....American Bank Bldg., Oakland, Calif.
Harry Bear, '35.....410 Professional Bldg., Richmond, Va.
C. Willard Camalier, '35.....1726 Eye St., N. W., Washington, D. C.
Thomas L. Grisamore, '35.....29 E. Madison St., Chicago, Ill.
E. G. Meisel, '35.....121 University Place, Pittsburgh, Pa.
Marcus L. Ward, '35.....1308 Cambridge Road, Ann Arbor, Mich.
Albert W. Crosby, '34.....215 Whitney Ave., New Haven, Conn.
C. E. Rudolph, '34.....905 Metropolitan Bank Bldg., Minneapolis, Minn.
John F. Stephan, '34.....1034 Keith Bldg., Cleveland, Ohio
George B. Winter, '34.....Frisco Bldg., St. Louis, Mo.